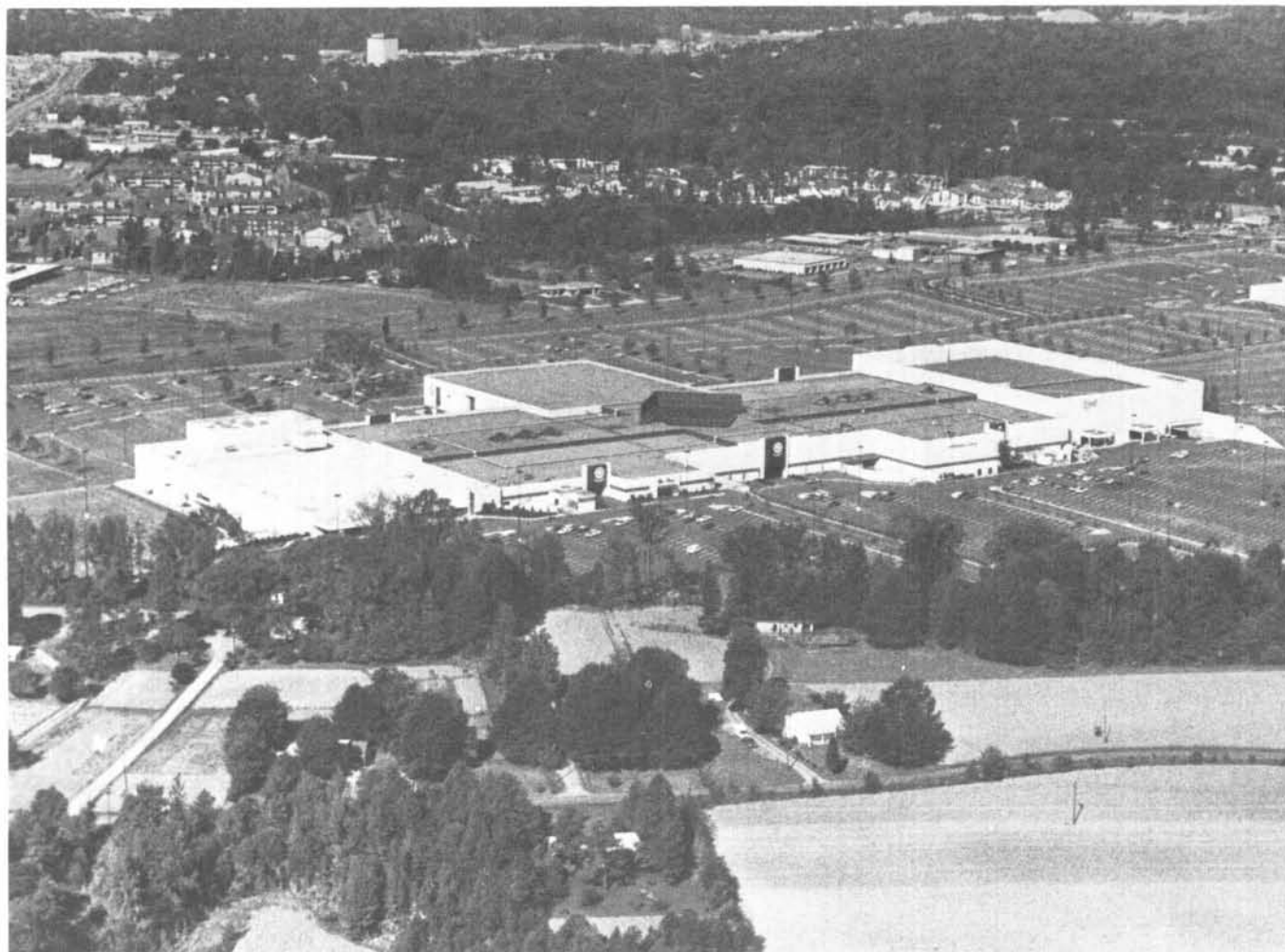


Soil survey of

Mecklenburg County, North Carolina



**United States Department of Agriculture
Soil Conservation Service**

in cooperation with

**Mecklenburg County Board of Commissioners and
North Carolina Agricultural Experiment Station**

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1972-77. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service, the Mecklenburg County Board of Commissioners, and the North Carolina Agricultural Experiment Station. It is part of the technical assistance furnished to the Mecklenburg Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Shopping mall in Mecklenburg County and adjacent farmland. Cecil sandy clay loam is the dominant soil in the foreground.

Contents

	Page		Page
Index to map units	ii	Physical and chemical properties.....	34
Summary of tables	iii	Soil and water features.....	34
Foreword	v	Engineering test data.....	35
General nature of the county	1	Classification of the soils	35
Physiography, relief, and drainage	1	Soil series and morphology.....	36
Water supply	2	Appling series.....	36
Climate.....	2	Cecil series.....	37
How this survey was made	2	Davidson series	37
General soil map for broad land use planning	3	Enon series	38
1. Cecil	4	Georgeville series.....	38
2. Cecil-Urban land	4	Goldston series.....	39
3. Iredell-Mecklenburg.....	4	Helena series	39
4. Wilkes-Enon	4	Iredell series.....	40
5. Enon-Helena-Vance	5	Lignum series.....	40
6. Pacolet-Cecil.....	5	Mecklenburg series	41
7. Monacan.....	5	Monacan series.....	41
8. Georgeville-Goldston-Lignum.....	5	Pacolet series.....	42
Soil maps for detailed planning	6	Vance series.....	42
Use and management of the soils	23	Wilkes series.....	43
Crops and pasture.....	23	Formation of the soils	43
Yields per acre.....	24	Factors of soil formation.....	43
Capability classes and subclasses	25	Climate.....	44
Woodland management and productivity	25	Plant and animal life.....	44
Landscaping.....	26	Parent material.....	44
Engineering	27	Relief	45
Building site development.....	28	Time	45
Sanitary facilities	28	References	45
Construction materials	29	Glossary	45
Water management.....	30	Illustrations	51
Recreation	31	Tables	59
Wildlife habitat	32		
Soil properties	33		
Engineering properties.....	33		

Issued June 1980

Index to Map Units

	Page		Page
ApB—Appling sandy loam, 2 to 8 percent slopes	6	IrB—Iredell fine sandy loam, 1 to 8 percent slopes ...	14
ApD—Appling sandy loam, 8 to 15 percent slopes....	7	luB—Iredell-Urban land complex, 0 to 8 percent	
CeB2—Cecil sandy clay loam, 2 to 8 percent		slopes.....	15
slopes, eroded	7	LgB—Lignum gravelly silt loam, 2 to 8 percent	
CeD2—Cecil sandy clay loam, 8 to 15 percent		slopes.....	15
slopes, eroded	8	MeB—Mecklenburg fine sandy loam, 2 to 8 percent	
CuB—Cecil-Urban land complex, 2 to 8 percent		slopes.....	16
slopes.....	8	MeD—Mecklenburg fine sandy loam, 8 to 15	
CuD—Cecil-Urban land complex, 8 to 15 percent		percent slopes	16
slopes.....	9	MkB—Mecklenburg-Urban land complex, 2 to 8	
DaB—Davidson sandy clay loam, 2 to 8 percent		percent slopes	17
slopes.....	9	MO—Monacan soils.....	17
DaD—Davidson sandy clay loam, 8 to 15 percent		MS—Monacan soils and Arens.....	18
slopes.....	10	PaE—Pacolet sandy loam, 15 to 25 percent slopes ..	18
DaE—Davidson sandy clay loam, 15 to 25 percent		PaF—Pacolet sandy loam, 25 to 45 percent slopes ..	18
slopes.....	10	PB3—Pacolet-Udorthents complex, gullied	19
EnB—Enon sandy loam, 2 to 8 percent slopes	10	Pt—Pits.....	19
EnD—Enon sandy loam, 8 to 15 percent slopes	11	UL—Udorthents, loamy	19
GeB2—Georgeville silty clay loam, 2 to 8 percent		UO—Udorthents, sanitary landfill	19
slopes, eroded	11	Ur—Urban land.....	20
GeD2—Georgeville silty clay loam, 8 to 15 percent		VaB—Vance sandy loam, 2 to 8 percent slopes	20
slopes, eroded	12	VaD—Vance sandy loam, 8 to 15 percent slopes.....	20
GoB—Goldston slaty silt loam, 2 to 8 percent		WkB—Wilkes loam, 4 to 8 percent slopes	21
slopes.....	12	WkD—Wilkes loam, 8 to 15 percent slopes	21
GoD—Goldston slaty silt loam, 8 to 15 percent		WkE—Wilkes loam, 15 to 25 percent slopes	21
slopes.....	13	WkF—Wilkes loam, 25 to 45 percent slopes	22
HeB—Helena sandy loam, 2 to 8 percent slopes.....	13	WuD—Wilkes-Urban land complex, 8 to 15 percent	
HuB—Helena-Urban land complex, 2 to 8 percent		slopes.....	22
slopes.....	14		
IrA—Iredell fine sandy loam, 0 to 1 percent slopes ...	14		

Summary of tables

	Page
Acreage and proportionate extent of the soils (Table 4)	62
<i>Acres. Percent.</i>	
Building site development (Table 8)	73
<i>Shallow excavations. Dwellings without basements.</i>	
<i>Dwellings with basements. Small commercial build-</i>	
<i>ings. Local roads and streets. Lawns and landscap-</i>	
<i>ing.</i>	
Classification of the soils (Table 18)	97
<i>Soil name. Family or higher taxonomic class.</i>	
Construction materials (Table 10)	79
<i>Roadfill. Sand. Gravel. Topsoil.</i>	
Engineering properties and classifications (Table 14)	88
<i>Depth. USDA texture. Classification—Unified,</i>	
<i>AASHTO. Fragments greater than 3 inches. Percent-</i>	
<i>age passing sieve number—4, 10, 40, 200. Liquid</i>	
<i>limit. Plasticity index.</i>	
Engineering test data (Table 17)	95
Freeze dates in spring and fall (Table 2)	61
<i>Probability. Temperature—24 F or lower, 28 F or</i>	
<i>lower, 32 F or lower.</i>	
Growing season length (Table 3)	61
<i>Probability. Daily minimum temperature during grow-</i>	
<i>ing season—Higher than 24 F, Higher than 28 F,</i>	
<i>Higher than 32 F.</i>	
Suitable landscape plants and trees (Table 7)	67
<i>Shrubs—Evergreen, Deciduous. Ground covers.</i>	
<i>Grasses. Trees—Deciduous, Evergreen.</i>	
Physical and chemical properties of soils (Table 15)	91
<i>Depth. Permeability. Available water capacity. Soil re-</i>	
<i>action. Shrink-swell potential. Erosion factors—K, T.</i>	
Recreational development (Table 12)	83
<i>Camp areas. Picnic areas. Playgrounds. Paths and</i>	
<i>trails. Golf fairways.</i>	
Sanitary facilities (Table 9)	76
<i>Septic tank absorption fields. Sewage lagoon areas.</i>	
<i>Trench sanitary landfill. Area sanitary landfill. Daily</i>	
<i>cover for landfill.</i>	
Soil and water features (Table 16)	93
<i>Hydrologic group. Flooding—Frequency, Duration,</i>	
<i>Months. High water table—Depth, Kind, Months.</i>	
<i>Bedrock—Depth, Hardness. Risk of corrosion—Un-</i>	
<i>coated steel, Concrete.</i>	

Summary of tables—Continued

Temperature and precipitation data (Table 1)	Page 60
<i>Month. Temperature—Average daily maximum, average daily minimum; average; 2 years in 10 will have—Maximum temperature higher than, minimum temperature lower than, average number of growing degree days. Precipitation—Average; 2 years in 10 will have—Less than, More than; Average number of days with 0.10 inch or more; Average snowfall.</i>	
Water management (Table 11)	81
<i>Limitations for—Pond reservoir areas; Embankments, dikes, and levees. Features affecting—Drainage, Terraces and diversions, Grassed waterways.</i>	
Wildlife habitat potentials (Table 13)	86
<i>Potential for habitat elements—Grain and seed crops, Grasses and legumes, Wild herbaceous plants, Hardwood trees, Coniferous plants, Wetland plants, Shallow water areas. Potential as habitat for—Openland wildlife, Woodland wildlife, Wetland wildlife.</i>	
Woodland management and productivity (Table 6)	65
<i>Ordination symbol. Management concerns—Erosion hazard, Equipment limitation, Seedling mortality, Plant competition. Potential productivity—Important trees, Site index. Trees to plant.</i>	
Yields per acre of crops and pasture (Table 5)	63
<i>Corn, Corn silage, Soybeans, Wheat, Oats, Grass-legume hay, Pasture.</i>	

Soil survey of Mecklenburg County, North Carolina

United States Department of Agriculture
Soil Conservation Service
in cooperation with

Mecklenburg County Board of Commissioners and
North Carolina Agricultural Experiment Station

By Clifford M. Mc Cachren,
Soil Conservation Service

Soils surveyed by Clifford M. Mc Cachren,
William E. Woody, Jerry V. Stimpson,
Clarence E. Brandon, and Roger J. Leab,
Soil Conservation Service

MECKLENBURG is a highly urbanized county in the south-central part of North Carolina, adjoining York and Lancaster Counties, South Carolina. The county has a total area of 336,530 acres, or 525 square miles.

In 1977, the total population of Mecklenburg County was approximately 424,000, which is 7 percent of the population in the state. Charlotte, the county seat, has a population of approximately 339,200. It is the largest city in the state and the hub of the major trade, distribution, financial, and transportation center of the Southeast. Urbanization is claiming many acres of farmland in the county each year. More than 50 percent of the county is now in nonfarm use.

Farming is still a viable industry in the county. Hay, soybeans, and corn for grain and silage make up a large percentage of the harvested cropland. The rest is small grain. Beef cattle is the dominant livestock enterprise. Dairying also has a major impact on the agricultural economy. Swine and poultry enterprises are relatively unimportant.

General nature of the county

Mecklenburg County was established in 1762 from a part of Anson County and included, at that time, parts of what are now Cabarrus, Union, Lincoln, Rutherford, Cleveland, and Gaston Counties. The county, in its present boundaries, was established in 1842.

Settlers chose the name Mecklenburg for the county, hoping to gain favor with King George III of England whose wife, Queen Charlotte, was born in a German province of that name. The city of Charlotte, incorporated on November 7, 1768, was named for the queen.

Following the Revolutionary War in 1799, gold was discovered near Concord in Cabarrus County, then a part of Mecklenburg. Charlotte became the gold-mining capital of the United States until the discovery of gold in California in 1849. The quantity of rich ore led to the

establishment of a branch of the United States Mint in Charlotte in 1836. Five million gold dollars were coined at the mint between 1837 and 1861.

By 1900, Mecklenburg had a population of 55,268. The population tripled by 1950 and then more than doubled by the 1970's. The Camp Green Army Base was established in 1917. The forerunner of Douglas Municipal Airport was opened in 1936 and the Charlotte Memorial Hospital in 1940. City and county schools were consolidated in 1959. Central Piedmont College opened in 1963 and the University of North Carolina at Charlotte in 1965.

Public and private educational facilities in the county have kept pace with the population growth. There are 94 elementary and junior high schools and 10 high schools in the Charlotte-Mecklenburg System. In addition, there are 14 state-approved parochial schools and a number of other private schools.

Institutions of higher education in the county include the University of North Carolina at Charlotte, Queens College, Johnson C. Smith University, Davidson College, and the Central Piedmont Community College, which offers a wide variety of vocational, junior college, and adult education programs.

Industrial and commercial development has been enhanced by excellent transportation facilities. Two interstate highways, I-77 and I-85, converge at Charlotte. There are 115 trucking firms in Charlotte, operating more than 5,000 tractor-trailers. Charlotte is the only major trucking point with overnight access to both New York and Florida. In addition, two railroad lines and five commercial airlines serve the area.

Physiography, relief, and drainage

Mecklenburg County is entirely within the Southern Piedmont physiographic region. It is characterized by broad, gently rolling interstream areas and by steeper slopes along the drainageways. No prominent hills stand out above the generally level uplands. The highest point

in the county Cornelius, in the extreme northern part, is slightly more than 830 feet above sea level. The lowest is 520 feet at the State line south of Pineville. The Catawba River, with the impounded waters of three hydroelectric dams, forms the western boundary and drains approximately three-fourths of the county. The eastern side of the county is drained by tributaries of the Rocky River. The divide is a broad ridge extending generally from Davidson southward through Derita to Mint Hill.

Three large creeks—Irwin, Little Sugar, and Briar—drain most of the urban area of the city of Charlotte. These tributaries flow southward through the county and converge into Sugar Creek before it enters the Catawba River in Lancaster County, South Carolina. Rapid runoff from the urban areas during rainstorms has caused flooding and resulting property damage in low-lying areas. It has become increasingly severe in recent years.

Water supply

A valuable resource of Mecklenburg County is an abundant supply of good water. Most water used for municipal and industrial purposes is supplied by the Catawba River. This water, flowing from the southeastern slopes of the Blue Ridge Mountains, is of excellent quality.

Municipal water for most towns is obtained from lakes on the river. Lake Norman supplies Davidson, Cornelius, and Huntersville. Mountain Island Lake supplies Charlotte, Pineville, and Matthews. The amount of water taken from the lakes is less than 1 percent of the daily flow of the Catawba River.

Water for the town of Mint Hill is supplied by wells. Water to all other areas also is supplied by private or community wells. This ground water is of good quality.

Climate

Mecklenburg County is hot and is generally humid in summer. Winter is moderately cold but short because the mountains to the west protect the county against many cold waves. Precipitation is evenly distributed throughout the year and is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Charlotte, North Carolina for the period 1951 to 1975. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 43 degrees F, and the average daily minimum temperature is 32 degrees. The lowest temperature on record, which occurred at Charlotte on December 13, 1962, is 2 degrees. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred on September 6, 1954, is 104 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 22 inches, or 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest rainfall during a 24 hour period was 5.41 inches at Charlotte on October 8 and 9, 1976. Thunderstorms occur on about 42 days each year, and most occur in summer.

Average seasonal snowfall is 6 inches. The greatest snow depth at any one time during the period of record was 12 inches. On the average, 2 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The percentage of possible sunshine is 70 in summer and 60 in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

Every few years in winter, heavy snow covers the ground for a few days to a week. Every few years late in summer or in autumn, a tropical storm moving inland from the Atlantic Ocean causes extremely heavy rain for 1 to 3 days.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and

named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

The maps in this survey join those of the published surveys of Iredell County, North Carolina, and Lancaster and York Counties, South Carolina. The soil boundaries match, but as a result of updated concepts, some of the soil names have been changed.

In the map unit descriptions throughout the survey relative terms assigned to soil potential classes indicate the quality of a soil for a particular use compared with that of other soils in the county. The potential is based on the capability of the soil to produce crops or to support a given structure or activity. Determining the potential involves four basic steps: (1) identify for each soil use those properties and features that affect the anticipated use; (2) identify and evaluate the kinds of practices that can overcome the limiting soil features; (3) evaluate the level of performance or yield after installation of acceptable practices; and (4) arrange the soils in

order according to performance, from the best to the poorest.

Soil potential is defined as high, moderately high, moderate, and low.

High potential indicates that production or performance is well above local standards, that the cost of overcoming the limitations is low as related to local standards, and that there are no continuing soil limitations.

Moderately high potential indicates that production or performance is at or above the level of local standards, that overcoming the soil limitations is judged locally to be economically feasible, and that continuing limitations after corrective practices are installed do not detract appreciably from environmental quality or economic returns.

Moderate potential indicates that production or performance is somewhat below local standards, or that the cost of overcoming limitations is high, or that limitations continuing after corrective practices are installed detract from environmental quality or economic returns.

Low potential indicates that production or performance is significantly below local standards, or that overcoming the limitations is costly, or that limitations continuing after corrective practices are installed detract appreciably from environmental quality or economic returns.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

1. Cecil

Gently sloping to strongly sloping, well drained soils that have a predominantly clayey subsoil; formed in residuum from acid igneous and metamorphic rock

This unit occurs throughout most of the county on broad smooth ridges and side slopes on the uplands. It makes up about 41 percent of the county. It is about 65 percent Cecil soils and 35 percent soils of minor extent.

Cecil soils have a yellowish red sandy clay loam surface layer and a red clay and clay loam subsoil.

Minor in this unit are areas of the steeper Pacolet soils, areas of Helena soils in depressions and around the heads of drainageways, and small scattered areas of Mecklenburg and Enon soils where the parent rock is less acid.

This unit is used mainly as cropland or pasture. Erosion is the main limitation in farming.

The Cecil soils in this unit have moderate potential for most row crops, moderate potential for woodland, and high potential for most urban uses.

2. Cecil-Urban land

Nearly level to strongly sloping urban areas on well drained soils that have a predominantly clayey subsoil; formed in residuum from acid igneous and metamorphic rock

This unit, the business and commercial district of downtown Charlotte and the commercial, industrial, and residential areas around the edges of the city, makes up about 18 percent of the county. It is about 52 percent the Cecil-Urban land complex, 20 percent Urban land, and 28 percent soils of minor extent.

The Cecil-Urban land complex part of this unit is 50 to 70 percent Cecil soils and 15 to 35 percent Urban land. It is mainly around the edges of the city. Cecil soils have a yellowish red sandy clay loam surface layer and a red clay and clay loam subsoil. Urban land is covered mostly by houses, paved streets and sidewalks, apartment buildings, small shopping centers, schools, churches, paved parking lots, and recreational areas.

The Urban land part of this unit consists of areas where more than 85 percent of the surface is covered by asphalt, concrete, buildings, or other impervious cover. It is mainly in the central business district of Charlotte and along major traffic arteries around the city.

Minor in this unit are scattered areas of Mecklenburg and Enon soils. These soils are underlain by thin strata of acidic and basic rocks and are thus less acid than Cecil soils. Also in this unit are reshaped areas, as a result of site preparation during construction, and cut and fill areas. In the cut areas most or all of the natural soil has been removed. In the fill areas the original surface is covered with more than 20 inches of fill material.

This unit is used almost entirely for urban purposes.

3. Iredell-Mecklenburg

Nearly level to strongly sloping, moderately well drained and well drained soils that have a predominantly clayey subsoil; formed in residuum from diorite, gabbro, and other rock high in ferromagnesian minerals

The largest areas of this unit are in the southwestern and south-central parts of the county. Other areas are in the northeastern and northwestern parts. The landscape is one of broad flats and gentle side slopes. The flats are broken by many large knolls of slightly higher elevation.

This unit makes up about 11 percent of the county. It is about 40 percent Iredell soils, 35 percent Mecklenburg soils, and 25 percent soils of minor extent.

Iredell soils are moderately well drained. They are on the broad flats and gentle side slopes. The surface layer is olive brown fine sandy loam, and the subsoil is light olive brown clay and clay loam.

Mecklenburg soils are well drained. They occupy the broad ridges, the gently sloping to strongly sloping side slopes, and the large knolls on the flat landscape. The surface layer is dark reddish brown fine sandy loam, and the subsoil is yellowish red clay.

The minor soils in this unit are mostly Wilkes and Davidson in the southern part of the county and Enon, Wilkes and Helena in the northern part.

This unit is used mainly as cropland and pasture. The wetter areas are mostly forest. Erosion and wetness are the main limitations in farming.

The major soils in this unit have moderately high potential for most crops, moderate potential for woodland, and low potential for most urban uses.

4. Wilkes-Enon

Gently sloping to steep, well drained soils that have a predominantly clayey subsoil; formed in residuum from diorite, hornblende schist, and other basic rock, or from mixed acidic and basic rock

This map unit occurs as scattered areas throughout the county on broad and narrow ridges and strongly sloping to steep side slopes. It makes up 13 percent of the county. It is about 40 percent Wilkes soils, 30 percent Enon soils, and 30 percent soils of minor extent.

Wilkes soils are on narrow ridges and moderately steep to steep side slopes adjacent to drainageways. The surface layer is dark grayish brown loam, and the subsoil is strong brown clay and clay loam.

Enon soils are on broad ridges and gently sloping to strongly sloping side slopes. The surface layer is brown sandy loam. The subsoil is yellowish brown sandy clay loam, clay, and clay loam.

The minor soils in this unit are mostly Mecklenburg and Iredell in the southern part of the county and Mecklenburg and Helena in the northern part.

This unit is used mainly as pasture and woodland. Some gently sloping areas are cropland. Erosion, slope, and the depth to bedrock are the main limitations in farming.

Wilkes soils have low potential for most crops. Enon soils, however, have moderately high or moderate potential. The potential is moderate for woodland and moderate or low for most urban uses.

5. Enon-Helena-Vance

Gently sloping to strongly sloping, well drained and moderately well drained soils that have a predominantly clayey subsoil; formed in residuum from mixed acidic and basic igneous and metamorphic rock

This map unit, in the northern part of the county, includes Coulwood and an area extending northeastward to Huntersville. It occurs as broad, gently sloping ridges and strongly sloping side slopes. It makes up 6 percent of the county. It is about 35 percent Enon soils, 20 percent Helena soils, 12 percent Vance soils, and 33 percent soils of minor extent.

The well drained Enon soils are on ridges and gently sloping to strongly sloping side slopes. The surface layer is brown sandy loam, and the subsoil is yellowish brown sandy clay loam, clay, and clay loam.

The moderately well drained Helena soils are on broad ridges, gentle side slopes, and in depressions and low areas around the heads of drainageways. The surface layer is light olive brown sandy loam. The subsoil is brownish yellow sandy clay loam, brownish yellow and yellowish brown clay, and mottled yellowish brown, light gray, and reddish brown clay loam.

The well drained Vance soils are on ridges and gently sloping to strongly sloping side slopes. The surface layer is yellowish brown sandy loam, and the subsoil is strong brown clay.

The minor soils are mostly Wilkes and Cecil and, to a lesser extent, Mecklenburg and Iredell. They occur as scattered areas throughout the unit.

This unit is used mainly as cropland and pasture. The steeper areas are forest. Erosion and wetness are the main limitations in farming.

The major soils in this unit have moderate or moderately high potential for most crops, moderate or moderately high potential for woodland, and low potential for most urban uses.

6. Pacolet-Cecil

Gently sloping to steep, well drained soils that have a predominantly clayey subsoil; formed in residuum from acid igneous and metamorphic rock

This map unit is at the southwest edge of the county. It consists of narrow ridges that have moderately steep and steep side slopes. It makes up 5 percent of the county. It is about 50 percent Pacolet soils, 30 percent Cecil soils, and 20 percent soils of minor extent.

The moderately steep to steep Pacolet soils are adjacent to drainageways. The surface layer is very dark grayish brown sandy loam, and the subsoil is red clay or clay loam.

Cecil soils are on ridges and strongly sloping side slopes. The surface layer is yellowish red sandy clay loam, and the subsoil is red clay and clay loam.

The minor soils in this unit are mostly Davidson and to a lesser extent Mecklenburg. They commonly occur as scattered areas throughout the unit.

This unit is mostly forest. Some gently sloping areas are used as cropland. Erosion and slope are the main limitations in farming.

Pacolet soils are not suited to most crops. Cecil soils, however, have moderate potential. Both have moderate potential for woodland. Pacolet soils have low potential for most urban uses. Cecil soils have high or moderate potential.

7. Monacan

Nearly level, somewhat poorly drained soils that have a predominantly loamy subsoil; formed in fluvial sediment on flood plains

This map unit occurs throughout the county as long, narrow bands parallel to streams and drainageways. It makes up about 4 percent of the county. It is about 80 percent Monacan soils and 20 percent soils of minor extent.

Monacan soils have a brown loam, fine sandy loam, or sandy loam surface layer. The subsoil is yellowish red loam, brown silty clay loam, dark brown fine sandy loam, dark gray and gray sandy clay loam, and light gray sandy clay.

Minor in this unit are areas of Helena soils on narrow base slopes adjacent to the flood plain. There are also areas where fill material has been added to elevate the surface.

This unit is used mainly as cropland and pasture. Wetness and flooding are the main limitations in farming.

The major soils in this unit have moderate potential for most crops, very high potential for woodland, and low potential for urban uses.

8. Georgeville-Goldston-Lignum

Gently sloping to strongly sloping, well drained and moderately well drained soils that have a clayey or loamy subsoil; formed in residuum from fine grained schist or slate

This map unit is in the eastern tip of the county on broad ridges and strongly sloping side slopes. It makes up about 2 percent of the county. It is about 45 percent Georgeville soils, 10 percent Goldston soils, 8 percent Lignum soils, and 37 percent soils of minor extent.

The well drained Georgeville soils are on broad ridges and strongly sloping side slopes. The surface layer is yellowish red silty clay loam, and the subsoil is red silty clay and red silty clay loam.

The well drained Goldston soils are on narrow ridges and strongly sloping side slopes. The surface layer is brown slaty silt loam, and the subsoil is brownish yellow slaty silt loam.

The moderately well drained Lignum soils are on gentle side slopes and in depressions and low areas around drainageways. The surface layer is yellowish brown gravelly silt loam. The subsoil is brownish yellow silty clay loam and strong brown, yellowish brown, or reddish yellow clay.

Minor soils in this unit are mostly Cecil, Enon, and Helena. They occur mainly as small scattered areas throughout the unit.

This unit is used mostly as woodland. Some gently sloping areas are used as cropland. Erosion, the depth to bedrock in the Goldston soil, and the wetness are the main limitations in farming.

The Georgeville and Lignum soils in this unit have high potential for crops. Goldston soils have low potential. All have moderate or moderately high potential for woodland. Georgeville soils have high to moderate potential for most urban uses. Goldston and Lignum soils have low potential.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations

shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Cecil sandy clay loam, 2 to 8 percent slopes, eroded, is one of several phases within the Cecil series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Helena-Urban land complex, 2 to 8 percent slopes is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Pits is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

ApB—Appling sandy loam, 2 to 8 percent slopes. This well drained soil is on broad, smooth ridges on the uplands. Mapped areas are commonly oblong and range from 6 to 80 acres.

Typically, the surface layer is yellowish brown sandy loam about 8 inches thick. The subsoil is 35 inches thick. The upper part is brownish yellow sandy loam, the middle part is yellowish brown clay, and the lower part is brownish yellow clay. The underlying material to a depth of 66 inches is red, brownish yellow, and white sandy clay loam.

Included with this soil in mapping are a few eroded areas where the surface layer is sandy clay loam and a few areas of similar soils that have a clayey subsoil slightly less than 24 inches thick. Also included are a few intermingled areas of Cecil and Vance soils. The included areas, each less than 5 acres, make up 10 to 20 percent of this map unit.

The organic matter content is low in the surface layer of this Appling soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is used as cropland (fig. 1). Some areas are used for hay or pasture. The rest is forested.

This soil has high potential for corn, soybeans, small grain, pasture, hay, and horticultural crops. Good tilth can be maintained by returning crop residue to the soil. Erosion is a hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, reduce runoff and help to control erosion.

This soil has moderately high potential for broadleaf and needleleaf trees. The dominant trees are yellow-poplar, sweetgum, hickory, ash, white oak, red oak, loblolly pine, and shortleaf pine. The main understory species are dogwood, sourwood, redbud, and black cherry. There are no significant limitations in woodland use and management.

This soil has high potential for most urban uses. The moderate permeability is a limitation for septic tank absorption fields. This limitation can generally be overcome by modifying the field or by increasing the size of the absorption area, or both. The potential is dominantly high for recreation.

The capability subclass is IIe. The woodland group is 30.

ApD—Appling sandy loam, 8 to 15 percent slopes.

This well drained soil is on side slopes on the uplands. Mapped areas are commonly oblong and range from 4 to 25 acres.

Typically, the surface layer is yellowish brown sandy loam about 8 inches thick. The subsoil is 35 inches thick. The upper part is brownish yellow sandy loam, the middle part is yellowish brown clay, and the lower part is brownish yellow clay. The underlying material to a depth of 66 inches is red, brownish yellow, and white sandy clay loam.

Included with this soil in mapping are a few eroded areas where the surface layer is sandy clay loam and a few areas of similar soils that have a clayey subsoil slightly less than 24 inches thick. Also included are a few intermingled areas of Cecil and Vance soils. The included areas, each less than 5 acres, make up 10 to 20 percent of this map unit.

The organic matter content is low in the surface layer of this Appling soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is forest. The rest is used for crops, hay, or pasture.

This soil has moderate potential for corn, soybeans, small grain, pasture, hay, and horticultural crops. Good tilth can be maintained by returning crop residue to the soil. Erosion is a hazard if cultivated crops are grown. Minimum tillage or the use of cover crops, including grasses and legumes, help to control erosion in cultivated areas.

The potential is moderately high for broadleaf and needleleaf trees. Dominant trees are yellow-poplar, sweetgum, hickory, ash, white oak, red oak, loblolly pine, and shortleaf pine. The main understory species are dogwood, sourwood, redbud, black cherry, and sassafras. There are no significant limitations in woodland use and management.

This soil has only moderate potential for most urban uses because of the slope and the moderate permeability. The slope limitation can be reduced or modified by special planning, design, and maintenance. The moderate permeability is a limitation for septic tank absorption fields. This limitation can generally be overcome by modifying the field or by increasing the size of the absorption area, or both. Erosion is a hazard if the ground cover is removed. The potential is low for playgrounds because of the slope. It is high for paths and trails and moderate for most other kinds of recreation.

The capability subclass is IVe. The woodland group is 30.

CeB2—Cecil sandy clay loam, 2 to 8 percent slopes, eroded. This well drained soil is on broad, smooth ridges on the uplands. Mapped areas are oval and range from 6 to more than 1,000 acres.

Typically, the surface layer is yellowish red sandy clay loam about 6 inches thick. The subsoil is 47 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is red and yellow loam.

Included with this soil in mapping are a few uneroded areas where the surface layer is brown sandy loam and a few areas of soils that are similar to the Cecil soils but have a clayey subsoil less than 24 inches thick. Also included are many areas of rills and shallow gullies, a

The Urban land part of this unit is covered with houses, paved streets, parking lots, driveways, small shopping centers, industrial buildings, schools, churches, and apartment complexes (fig. 3).

In some altered, or disturbed, areas the Cecil soil is covered with more than 20 inches of fill material. In others, more than two-thirds of the natural soil has been removed by cutting and grading.

Included in mapping are small areas of Appling, Enon, and Mecklenburg soils.

In disturbed areas erosion is a hazard because of the slope and the runoff. Surface runoff from rooftops and paved surfaces increases the hazard of flooding in low-lying areas downstream. The clayey subsoil is a limitation in landscaping. The moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by modifying the field or by increasing the size of the absorption area, or both.

Onsite investigation is generally needed before planning the use and management of this unit.

This unit is not assigned to a capability subclass or to a woodland group.

CuD—Cecil-Urban land complex, 8 to 15 percent slopes. This map unit consists of areas of Cecil soils and areas of Urban land primarily in the suburban areas of Charlotte. These areas are too small and too intricately mixed to be mapped separately. The undisturbed Cecil soil makes up 50 to 70 percent of each area, and Urban land makes up 15 to 35 percent. The rest of this unit consists of areas where most of the natural soil has been altered or covered as the result of grading and digging.

The undisturbed Cecil soil is well drained. Typically, the surface layer is yellowish red sandy clay loam about 6 inches thick. The subsoil is 47 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is red and yellow loam.

The organic matter content is low in the surface layer of this Cecil soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

The Urban land part of this unit is covered mostly with houses, paved streets, parking lots, driveways, small shopping centers, industrial buildings, churches, and apartment complexes.

In some altered, or disturbed, areas the Cecil soil is covered with more than 20 inches of fill material. In others, more than two-thirds of the natural soil has been removed by cutting and grading.

Included in mapping are small areas of Appling, Enon, and Mecklenburg soils.

If cover is not well established, soils on these areas have an erosion hazard. Grading is necessary for urban

development. Surface runoff from rooftops and paved surfaces causes an increased hazard of flooding in low-lying areas downstream. The clayey subsoil is a limitation to landscaping. The moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by modifying the field or by increasing the size of the absorption area, or both.

Onsite investigation is generally needed before planning use and management of this unit.

This unit is not assigned to a capability subclass or to a woodland group.

DaB—Davidson sandy clay loam, 2 to 8 percent slopes. This well drained soil is on broad ridges on the uplands. Mapped areas are commonly irregular and range from 4 to several hundred acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 7 inches thick. The subsoil to a depth of 103 inches is dark red clay loam in the upper part and dark red clay in the lower part.

Included with this soil in mapping are a few areas of soils that have a loam surface layer, a few areas of soils that are less acid than is typical, a few areas where the lower part of the subsoil is lighter red, and a few small eroded areas where the surface layer is clay loam. Also included are a few small areas of Cecil and Mecklenburg soils. The included areas make up 25 to 40 percent of this map unit.

The organic matter content is low in the surface layer of this Davidson soil. Permeability is moderate, the available water capacity is high, the shrink-swell potential is low, and surface runoff is medium. The subsoil ranges from very strongly acid to medium acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is used as woodland. The rest is cropland and pasture. Some areas along the Catawba River are used for recreation.

This soil has high potential for corn, soybeans, small grain, hay, pasture, and horticultural crops. Crop potential can be reduced through erosion. As the original surface layer is lost, the underlying sticky, clayey subsoil becomes part of the plow layer. This process lowers the overall tilth of the surface layer. Minimum tillage, the return of crop residue, and the use of cover crops, including grasses and legumes, reduce runoff and help to control erosion.

This soil has moderately high potential for broadleaf and needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, yellow-poplar, hickory, white oak, red oak, sweetgum, and ash. The main understory species are dogwood, sourwood, redbud, black cherry, and holly. The clayey subsoil is the main limitation in woodland use and management.

This soil has high potential for most urban uses. Because of the moderate permeability, this soil is limited for septic tank absorption fields. This limitation can be over-

come by modifying the field or by increasing the size of the absorption area, or both. This soil has only moderate potential for recreation because of the clayey subsoil.

The capability subclass is IIe. The woodland group is 3c.

DaD—Davidson sandy clay loam, 8 to 15 percent slopes. This well drained soil is on side slopes on the uplands. Mapped areas are oval and range from 4 to 80 acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 7 inches thick. The subsoil to a depth of 103 inches is dark red clay loam in the upper part and dark red clay in the lower part.

Included with this soil in mapping are a few areas of soils that have a loam surface layer, a few areas of soils that are less acid than is typical, a few areas where the lower part of the subsoil is lighter red, and a few small eroded areas where the surface layer is clay loam. Also included are a few small areas of Cecil and Mecklenburg soils. The included areas make up 25 to 40 percent of this map unit.

The organic matter content is low in the surface layer of this Davidson soil. Permeability is moderate, the available water capacity is high, the shrink-swell potential is low, and surface runoff is rapid. The subsoil ranges from very strongly acid to medium acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is used as woodland. The rest is cropland and pasture. Some small areas along the Catawba River are used for recreation.

This soil has moderate potential for corn, soybeans, small grain, hay, pasture, and horticultural crops. Good tilth can be maintained by returning crop residue to the soil. Erosion and the sticky and slippery nature of the soil, as a result of the high amount of clay, are hazards if cultivated crops are grown. Minimum tillage or the use of cover crops, including grasses and legumes, help to control erosion in cultivated areas.

The potential is moderately high for broadleaf and needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, yellow-poplar, hickory, white oak, red oak, sweetgum, and ash. The main understory species are dogwood, sourwood, redbud, black cherry, and holly. The clayey subsoil is the main limitation in woodland use and management.

This soil has only moderate potential for most urban uses because of the slope and the moderate permeability. The slope limitation can be reduced or modified by special planning, design, or maintenance. The moderate permeability is a limitation for septic tank absorption fields. The effects of moderate permeability can generally be overcome by modifying the field or by increasing the size of the absorption area, or both. Erosion is a hazard if the ground cover is removed. The potential is dominantly moderate for recreation because of the slope and the clayey subsoil.

The capability subclass is IVe. The woodland group is 3c.

DaE—Davidson sandy clay loam, 15 to 25 percent slopes. This well drained soil is on side slopes on the uplands. Mapped areas are oval and range from 4 to 80 acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 7 inches thick. The subsoil to a depth of 103 inches is dark red clay loam in the upper part and dark red clay in the lower part.

Included with this soil in mapping are a few areas of soils that have a loam surface layer, a few areas of soils that are less acid than is typical, a few areas where the lower part of the subsoil is lighter red, and a few small eroded areas where the surface layer is clay loam. Also included are a few small areas of Pacolet soil. The included areas make up 20 to 30 percent of this map unit.

The organic matter content is low in the surface layer of this Davidson soil. Permeability is moderate, the available water capacity is high, the shrink-swell potential is low, and surface runoff is rapid. The subsoil ranges from very strongly acid to medium acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is woodland. The rest is pasture. Some small areas along the Catawba River are used for recreation.

This soil has moderate potential for pasture. Proper pasture maintenance provides adequate protective cover.

The potential is moderately high for broadleaf and needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, yellow-poplar, hickory, white oak, red oak, sweetgum, and ash. The main understory species are dogwood, sourwood, redbud, black cherry, and holly. The slope is the main limitation in woodland use and management.

This soil has low potential for most urban recreational use because of the slope.

The capability subclass is VIe. The woodland group is 3r.

EnB—Enon sandy loam, 2 to 8 percent slopes. This well drained soil is on broad ridges on the uplands. Mapped areas are oval and range from 5 to 300 acres.

Typically, the surface layer is brown sandy loam about 7 inches thick. The subsoil is 29 inches thick. The upper part is yellowish brown sandy clay loam, the middle part is yellowish brown clay, and the lower part is yellowish brown clay loam. The underlying material to a depth of 60 inches is light olive brown clay loam and sandy loam.

Included with this soil in mapping are a few areas where the surface layer is fine sandy loam or loam, a few eroded areas where it is clay loam, and a few intermingled areas of Iredell, Mecklenburg, Vance, and

The organic matter content is low in the surface layer of this Georgeville soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is low, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is cropland. The rest is pasture or woodland.

This soil has high potential for corn, soybeans, pasture, hay, and horticultural crops. Because the surface layer is thin, this soil is difficult to keep in good tilth. The surface layer commonly crusts as it dries after a hard rain or becomes cloddy if worked when wet, both of which affect germination and cause poor or uneven crop growth. Minimum tillage, the return of crop residue to the soil, and the use of cover crops, including grasses and legumes, improve tilth, reduce runoff, and help to control erosion.

The potential is moderate for broadleaf or needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, yellow-poplar, hickory, white oak, red oak, sweetgum, and ash. The main understory species are dogwood, sourwood, redbud, black cherry, and holly. The clayey subsoil is the main limitation in woodland use and management.

This soil has high to moderate potential for most urban uses. The moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by modifying the field or by increasing the size of the absorption area, or both. The potential is only moderate for recreation because of the clayey subsoil.

The capability subclass is IIIe. The woodland group is 4c.

GeD2—Georgeville silty clay loam, 8 to 15 percent slopes, eroded. This well drained soil is on side slopes on the uplands. Mapped areas are oblong and range from 4 to 60 acres.

Typically, the surface layer is yellowish red silty clay loam about 5 inches thick. The subsoil is 44 inches thick. The upper part is red silty clay, and the lower part is red silty clay loam. The underlying material to a depth of 110 inches is brownish yellow, yellowish red, and strong brown silt loam.

Included with this soil in mapping are a few uneroded areas where the surface layer is darker brown and less clayey than is typical for the Georgeville soil, a few areas of rills and shallow gullies, and a few small areas where the subsoil is browner. Also included are a few intermingled areas of Cecil and Goldston soils. The included areas, each less than 5 acres, make up 10 to 20 percent of this map unit.

The organic matter content is low in the surface layer of this Georgeville soil. Permeability is moderate, the available water capacity is medium, the shrink-swell potential is low, and surface runoff is medium. The subsoil

is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The water table is below 6 feet.

Most of the acreage is cropland. The rest is pasture or woodland.

This soil has moderate potential for corn, soybeans, pasture, hay, and horticultural crops. Because the surface layer is thin, the soil is difficult to keep in good tilth. The surface layer commonly crusts as it dries after a hard rain or becomes cloddy if worked when wet, both of which affect germination and cause poor or uneven crop growth. Minimum tillage, the return of crop residue to the soil, and the use of cover crops, including grasses and legumes, improve tilth, reduce runoff, and help to control erosion.

This soil has moderate potential for broadleaf and needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, yellow-poplar, hickory, white oak, red oak, sweetgum, and ash. The main understory species are dogwood, sourwood, redbud, black cherry, and holly. The clayey subsoil is the main limitation in woodland use and management.

The potential is moderate for most urban uses because of the slope and the moderate permeability. The slope limitation can generally be overcome by special planning, design, or maintenance. The moderate permeability is a limitation for septic tank absorption fields. The effects of permeability on septic tank absorption fields generally can be overcome by modifying the field or by increasing the size of the absorption area, or both. Erosion is a hazard if the ground cover is removed. The potential is dominantly moderate for recreation because of the slope and the clayey subsoil.

The capability subclass is VIe. The woodland group is 4c.

GoB—Goldston slaty silt loam, 2 to 8 percent slopes. This well drained soil is on ridges and side slopes of the Piedmont Uplands. Mapped areas are commonly irregular and range from 4 to 20 acres.

Typically, the surface layer is brown slaty silt loam about 2 inches thick. The subsurface layer is mottled pale brown and very pale brown slaty silt loam 6 inches thick. The subsoil is brownish yellow slaty silt loam 8 inches thick. The underlying material to a depth of 24 inches is light yellowish brown slaty silt loam. It is about 75 percent by volume rock fragments. Below this is fractured, slightly weathered, fine-grained Carolina slate rock.

Included with this soil in mapping are a few areas where there is slate bedrock at or near the surface and some small areas of Georgeville and Lignum soils. The included areas, each less than 4 acres, make up 10 to 20 percent of this map unit.

The organic matter content is low in the surface layer of this Goldston soil. Permeability is moderately rapid, the available water capacity is very low, the shrink-swell potential is low, and surface runoff is medium. The sub-

soil ranges from extremely acid to medium acid. Depth to fractured bedrock is 20 to 40 inches. The water table is below 6 feet.

Most of the acreage is forest. Some areas are used for hay and pasture.

This soil has low potential for corn, soybeans, and horticultural crops. It has moderate potential for small grain, hay, and pasture. Erosion is a hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, reduce runoff and help to control erosion.

The potential for broadleaf and needleleaf trees is moderate. The dominant trees are eastern redcedar, loblolly pine, Virginia pine, southern red oak, and white oak. The main understory species are dogwood, redbud, holly, sourwood, and black cherry. There are no significant limitations in woodland use and management.

This soil has low to moderate potential for urban uses because of the depth to rock. The potential is only moderate for recreation because of the content of slate fragments and the depth to rock.

The capability subclass is IIIs. The woodland group is 4o.

GoD—Goldston slaty silt loam, 8 to 15 percent slopes. This well drained soil is on ridges and narrow side slopes of the uplands. Mapped areas are commonly oblong and range from 4 to 10 acres.

Typically, the surface layer is brown slaty silt loam about 2 inches thick. The subsurface layer is mottled pale brown and very pale brown slaty silt loam 6 inches thick. The subsoil is brownish yellow slaty silt loam 8 inches thick. The underlying material to a depth of 24 inches is light yellowish brown slaty silt loam. It is about 75 percent by volume rock fragments. Below this is fractured, slightly weathered, fine-grained Carolina slate rock.

Included with this soil in mapping are a few areas where there is slate bedrock at or near the surface and some small areas of Georgeville soils. The included areas, each less than 4 acres, make up 10 to 20 percent of this map unit.

The organic matter content is low in the surface layer of this Goldston soil. Permeability is moderately rapid, the available water capacity is very low, the shrink-swell potential is low, and surface runoff is moderately rapid. The subsoil ranges from extremely acid to medium acid. Depth to fractured bedrock is 20 to 40 inches. The water table is below 6 feet.

Most of the acreage is forest. Some areas are used for hay or pasture.

This soil has low potential for crops and moderate potential for hay and pasture. The erosion and the depth to bedrock are the main hazards if cultivated crops are grown. Minimum tillage or the use of cover crops, including grasses and legumes, help to control erosion in cultivated areas.

The potential is moderate for broadleaf and needleleaf trees. The dominant trees are eastern redcedar, loblolly pine, Virginia pine, southern red oak, and white oak. The understory species are mainly dogwood, redbud, holly, sourwood, and black cherry. There are no significant limitations in use or management.

This soil has low to moderate potential for urban uses because of the depth to rock. The potential is only moderate or low for recreation because of the slope, the content of slate fragments, and the depth to rock.

The capability subclass is VIs. The woodland group is 4o.

HeB—Helena sandy loam, 2 to 8 percent slopes. This moderately well drained soil is on broad ridges and in slightly concave areas around the heads of intermittent streams. Mapped areas are 5 to 100 acres.

Typically, the surface layer is light olive brown sandy loam about 8 inches thick. The subsoil is 32 inches thick. The upper part is brownish yellow sandy clay loam, the middle part is brownish yellow and yellowish brown clay, and the lower part is mottled yellowish brown, light gray, and reddish brown clay loam. The underlying material to a depth of 50 inches is light gray sandy clay. Below this is light gray sandy clay loam.

Included with this soil in mapping are a few areas of similar soils that are less acid than the Helena soil and a few wet areas in shallow depressions and seeps. In some areas slopes are more than 8 percent. Also included are small areas of Appling, Enon, Monacan, and Vance soils. The included soils make up about 10 to 25 percent of this unit.

The organic matter content is low in the surface layer of this Helena soil. Permeability is slow, the available water capacity is low, the shrink-swell potential is high, and surface runoff is medium. The subsoil is very strongly acid or strongly acid. Depth to rippable bedrock is 40 to 60 inches. Seasonally the perched water table is only 1 to 2.5 feet below the surface.

Most of the acreage is used for hay, pasture, and woodland. Some areas are used as cropland.

This soil has moderately high potential for most crops. Good tilth can be maintained by returning crop residue to the soil. Erosion is a hazard on the steeper slopes. Minimum tillage or the use of cover crops, including grasses and legumes, help to control erosion if these soils are cultivated.

The potential for broadleaf and needleleaf trees is moderately high. The dominant trees are loblolly pine, Virginia pine, sweetgum, sycamore, white oak, and yellow-poplar. The dominant understory species are dogwood, redbud, holly, sourwood, and black cherry. Seasonal wetness is the main limitation in woodland use and management.

The potential is low for urban uses because of the slow permeability and the high shrink-swell potential. The slow permeability significantly limits the absorption of

effluent in septic tank absorption fields. This limitation can be overcome by modifying the field or by increasing the size of the absorption area, or both. Strengthening the footings and foundations and removing the excess moisture are measures for shrink-swell. The potential is dominantly moderate for recreation because of the wetness and the slow permeability.

The capability subclass is *IIIe*. The woodland group is *3w*.

HuB—Helena-Urban land complex, 2 to 8 percent slopes. This map unit consists of areas of Helena soils and areas of Urban land primarily in the suburban areas of Charlotte. These areas are too small and too intricately mixed to be mapped separately. The undisturbed Helena soil makes up 50 to 70 percent of each area, and Urban land makes up 15 to 35 percent. The rest of this unit consists of areas where most of the natural soil has been altered or covered as the result of grading and digging.

The undisturbed Helena soil is well drained. Typically, the surface layer is light olive brown sandy loam about 8 inches thick. The subsoil is 32 inches thick. The upper part is brownish yellow sandy clay loam, the middle part is brownish yellow and yellowish brown clay, and the lower part is mottled yellowish brown, light gray, and reddish brown clay loam. The underlying material to a depth of 50 inches is light gray sandy clay. Below that, it is light gray sandy clay loam.

The organic matter content is low in the surface layer of this Helena soil. Permeability is slow, the available water capacity is low, the shrink-swell potential is high, and surface runoff is medium. The subsoil is very strongly acid or strongly acid. Depth to rippable bedrock is 40 to 60 inches. The seasonal perched water table is 1 to 2.5 feet below the surface.

The Urban land part of this unit is covered mostly with closely spaced houses, paved streets, parking lots, driveways, small shopping centers, industrial buildings, schools, churches, and apartment complexes.

In some altered, or disturbed, areas the Helena soil is covered with more than 20 inches of fill material. In others, more than two-thirds of the natural soil has been removed by cutting and grading.

Included with this complex in mapping are small areas of Appling, Enon, Monacan, and Vance soils.

Surface runoff from rooftops and paved surfaces increases the hazard of flooding in low-lying areas downstream. The clayey subsoil is a limitation in landscaping. The slow permeability, the wetness, and the high shrink-swell potential are limitations for most urban uses.

Onsite investigation is generally needed before planning the use and management of this unit.

This unit is not assigned to a capability subclass or to a woodland group.

IrA—Iredell fine sandy loam, 0 to 1 percent slopes.

This moderately well drained soil is on broad, flat areas on the uplands. Mapped areas range from 5 to several hundred acres.

Typically, the surface layer is olive brown fine sandy loam about 6 inches thick. The subsoil is light olive brown clay and clay loam 22 inches thick. The underlying material to a depth of 65 inches is light olive brown and olive loam.

Included with this soil in mapping are small areas where water is ponded in flats and depressions in winter and a few areas of similar soils that have slopes of more than 1 percent. Also included are small areas of Enon, Mecklenburg, and Wilkes soils. The included soils make up about 15 to 35 percent of this map unit.

The organic matter content is low in the surface layer of this Iredell soil. Permeability is slow, the available water capacity is medium, the shrink-swell potential is very high, and surface runoff is slow. The subsoil is slightly acid to mildly alkaline. Depth to bedrock is more than 60 inches. Seasonally the perched water table is only 1 to 2 feet below the surface.

Most of the acreage is used for crops, hay, or pasture. Some areas are forested.

This soil has moderately high potential for most crops. Small wet areas and slow permeability are the main limitations in the use and management of this soil. Tilth can be improved by returning crop residue to the soil and by not tilling the soil when wet. Erosion is a slight hazard. This soil has high potential for pasture forages (fig. 4).

The potential is moderate for broadleaf and needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, post oak, and white oak. The dominant understory species are dogwood, redbud, holly, sourwood, and black cherry. The clayey subsoil is the main limitation in woodland use and management.

The potential is low for most urban uses because of the very high shrink-swell potential, the wetness, and the slow permeability. The slow permeability significantly limits the absorption of effluent in septic tank absorption fields. This limitation generally can be partly overcome by modifying the fields or by increasing the size of the absorption area, or both. Corrective measures for the shrink-swell limitation include strengthening the footings and foundations and removing the excess moisture. Corrective measures for wetness are surface drainage, tile drainage, and land grading. The potential is dominantly moderate or low for recreation because of wetness.

The capability subclass is *IIw*. The woodland group is *4c*.

IrB—Iredell fine sandy loam, 1 to 8 percent slopes.

This moderately well drained soil is on broad ridges and broad gentle side slopes of the uplands. Mapped areas range from 5 to several hundred acres.

Typically, the surface layer is olive brown fine sandy loam about 6 inches thick. The subsoil is light olive brown clay and clay loam 22 inches thick. The underlying material to a depth of 65 inches is light olive brown and olive loam.

Included with this soil in mapping are a few areas of a similar soil that is more acid than Iredell soil. Also included are small areas of Enon, Mecklenburg, and Wilkes soils. The included soils make up about 10 to 25 percent of this unit.

The organic matter content is low in the surface layer of this Iredell soil. Permeability is slow, the available water capacity is medium, the shrink-swell potential is very high, and surface runoff is medium. The subsoil is slightly acid to mildly alkaline. Depth to bedrock is more than 60 inches. Seasonally the perched water table is only 1 to 2 feet below the surface.

Most of the acreage is used for crops, hay, and pasture. Some areas are forested.

This soil has moderately high potential for most crops. Small included wet areas, slow permeability, and erosion are the main limitations in the use and management of this soil. Keeping tillage to a minimum, not tilling when the soil is wet, and returning crop residue to the soil improve tilth and aid in controlling runoff and erosion.

The potential is moderate for broadleaf and needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, post oak, and white oak. The dominant understory species are dogwood, redbud, holly, sourwood, and black cherry. The clayey subsoil is the dominant limitation in woodland use and management.

This soil has low potential for most urban uses because of the very high shrink-swell potential, the wetness, and the slow permeability. The slow permeability significantly limits the absorption of effluent in septic tank absorption fields. This limitation generally can be partly overcome by modifying the field or by increasing the size of the absorption area, or both. Corrective measures commonly used for shrink-swell limitations are strengthening the footings and foundations and removing the excess moisture. Surface drainage, tile drainage, and land grading are commonly used to overcome wetness. The potential is moderate or low for most recreational uses because of wetness.

The capability subclass is IIe. The woodland group is 4c.

IuB—Iredell-Urban land complex, 0 to 8 percent slopes. This map unit consists of areas of Iredell soils and areas of Urban land primarily in the suburban areas of Charlotte. These areas are too small and too intricately mixed to be mapped separately. The undisturbed Iredell soil makes up 50 to 70 percent of each area, and Urban land makes up 15 to 35 percent. The rest of this unit consists of areas where most of the natural soil has been altered or covered as the result of grading and digging.

The undisturbed Iredell soil is moderately well drained. Typically, the surface layer is olive brown fine sandy loam about 6 inches thick. The subsoil is light olive brown clay and clay loam 22 inches thick. The underlying material to a depth of 65 inches is light olive brown and olive loam.

The organic matter content is low in the surface layer of this Iredell soil. Permeability is slow, the available water capacity is medium, the shrink-swell potential is very high, and surface runoff is medium. The subsoil is slightly acid to mildly alkaline. Depth to bedrock is more than 60 inches. Seasonally the perched water table is only 1 to 2 feet below the surface.

The Urban land part of this unit is covered mostly with closely-spaced houses, paved streets, parking lots, driveways, shopping centers, industrial buildings, schools, churches, and apartment complexes.

In some altered, or disturbed, areas the Iredell soil is covered with more than 20 inches of fill material. In others, more than two-thirds of the natural soil has been removed by cutting and grading.

Included in mapping are small areas of Enon, Mecklenburg, and Wilkes soils.

Erosion is a hazard because of the slope and runoff if these soils are disturbed for urban development. Runoff from rooftops and paved surfaces causes an increased hazard of flooding in low-lying areas downstream. The poor tilth and the clayey subsoil are limitations to good landscaping.

Onsite investigation is generally needed before planning use and management of this unit.

This unit is not assigned to a capability subclass or to a woodland group.

LgB—Lignum gravelly silt loam, 2 to 8 percent slopes. This moderately well drained soil is on low ridges and gentle side slopes around the heads of drainageways. Mapped areas include both convex and concave slopes that are oblong to oval and range from 4 to 20 acres.

Typically, the surface layer is yellowish brown gravelly silt loam about 5 inches thick. The subsoil is 32 inches thick. The upper part is brownish yellow silty clay loam, and the lower part is strong brown, yellowish brown, and reddish yellow clay. The underlying material to a depth of 50 inches is mottled yellow and gray silt. Hard slate rock is at a depth of 50 inches.

Included with this soil in mapping are a few areas of similar soils that are less acid than the Lignum soil and a few areas where the depth to hard bedrock is less than 40 inches. Also included are a few small areas of Enon, Goldston, and Helena soils.

The organic matter content is low in the surface layer of this Lignum soil. Permeability is slow, the available water capacity is medium, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is strongly acid or very strongly acid. Depth to bedrock

corn, soybeans, small grain, and horticultural crops and high potential for hay and pasture. Artificial drainage and flood control are needed to achieve optimum yields.

These soils have very high potential for broadleaf and needleleaf trees. The dominant trees are yellow-poplar, white oak, American sycamore, sweetgum, water oak, white oak, and loblolly pine.

These soils have low potential for all urban uses because of the wetness and flooding. The potential is low for camp areas and golf fairways because of the flooding and wetness. It is high for paths and trails. It is moderate for most other kinds of recreation because of the wetness and flooding.

The capability subclass is IIIw. The woodland group is 1c.

MS—Monacan soils and Arents. This map unit consists of nearly level, low-lying areas along major drainageways. It is 50 to 60 percent Monacan soil and 30 to 40 percent Arents. In some places the Monacan soil is undisturbed. In others it is up to 20 inches fill material. The composition of this map unit is more variable than that of most other units in the survey area but has been controlled well enough to be interpreted for the expected use of the soils.

The Monacan soil is somewhat poorly drained and is on flood plains. This soil is subject to frequent flooding. Up to 20 inches of fill material of varying composition has been added in some places.

Arents are areas where the natural soil has been altered by the addition of fill material. The fill is 20 inches to 8 feet thick. It has been added to elevate the surface in order to reduce flooding. The fill varies in composition. It has been transported from cut or graded areas of upland soils and is loamy or clayey. In some places it contains stones, logs, stumps, and solid waste.

About 10 to 15 percent of this unit is included areas of Urban land, which is covered with mostly streets, houses, parking lots, apartment complexes, and shopping centers. The Urban land is subject to flooding.

The main hazards in using these areas for permanent structures or other development are flooding, wetness, the settling of fill areas, and the sediment damage to streams from erosion of the fill material.

Onsite investigation is generally needed before planning use and treatment of this unit.

This unit is not assigned to a capability subclass. Monacan soil is in woodland group 1c.

PaE—Pacolet sandy loam, 15 to 25 percent slopes. This well drained soil is on side slopes adjacent to drainageways. Mapped areas are commonly oblong and range from 6 to 100 acres.

Typically, the surface layer is very dark grayish brown sandy loam about 3 inches thick. The subsoil is 28 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth

of 65 inches is mottled red, yellowish red, yellow, and reddish yellow sandy loam.

Included with this soil in mapping are a few small areas of Cecil, Davidson, and Wilkes soils. These included areas make up 25 to 35 percent of this map unit.

The organic matter content is low in the surface layer of this Pacolet soil. Permeability is moderate, the available water capacity is low, the shrink-swell potential is low, and surface runoff is rapid. The subsoil is very strongly acid to medium acid. Bedrock is below 60 inches. The water table is below 6 feet.

Most of the acreage is woodland. A few areas are used for pasture. The potential for pasture is moderate.

This soil has moderately high potential for broadleaf and needleleaf trees. The dominant trees are yellow-poplar, shortleaf pine, Virginia pine, loblolly pine, red oak, and white oak. The main understory species are dogwood and redbud. The slope is the main limitation in woodland use and management.

The potential is low for most urban and recreational uses because of the slope.

The capability subclass is VIe. The woodland group is 3r.

PaF—Pacolet sandy loam, 25 to 45 percent slopes. This well drained soil is on side slopes adjacent to drainageways. Mapped areas are commonly oblong and range from 6 to 80 acres.

Typically, the surface layer is very dark grayish brown sandy loam about 3 inches thick. The subsoil is 28 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is mottled red, yellowish red, yellow, and reddish yellow sandy loam.

Included with this soil in mapping are a few small areas of Cecil, Davidson, and Wilkes soils. These included areas make up 10 to 25 percent of this map unit.

The organic matter content is low in the surface layer of this Pacolet soil. Permeability is moderate, the available water capacity is low, the shrink-swell potential is low, and surface runoff is rapid. The subsoil is very strongly acid to medium acid. Bedrock is below 60 inches. The water table is below 6 feet.

Most of the acreage is woodland. A few areas are used for pasture. The potential for pasture is moderate.

This soil has moderately high potential for broadleaf and needleleaf trees. The dominant trees are yellow-poplar, shortleaf pine, Virginia pine, loblolly pine, red oak, and white oak. The main understory species are dogwood and redbud. The slope is the main limitation in woodland use and management.

This soil has low potential for most urban and recreational uses because of the slope.

The capability subclass is VIIe. The woodland group is 3r.

PB3—Pacolet-Udorthents complex, gullied. This map unit consists of areas of eroded Pacolet soil and areas where gullies have cut through the original soil into the underlying weathered bedrock. The slope ranges from 12 to 25 percent. The composition of this map unit is more variable than that of most other units in the survey area but has been controlled well enough to be interpreted for the expected use of the soils.

The Pacolet soil, on ridges between the gullies, makes up 40 to 70 percent of each unit. It is eroded to the extent that most of the original surface layer and part of the subsoil has been washed away. The present surface layer is clay loam or clay 1 to 4 inches thick. The subsoil is red clay 10 to 25 inches thick.

Udorthents, in the U-type gullies, make up 30 to 60 percent of each unit (fig. 5). They consist of weathered rock material exposed by erosion. This material commonly is soft, is not cohesive, and has little resistance to the cutting action of water. The gullies are mostly 4 to 20 feet deep. Some are still subject to active erosion. Others are either stabilized or are partly stabilized.

Vegetation is sparse in these areas. It is mostly naturally reseeded shortleaf and Virginia pine.

Limitations are severe for all farming and urban uses because of the gullies, slow infiltration, rapid runoff, and erodibility. Extensive grading would be needed if these areas were to be reclaimed. Establishing vegetation is difficult because of the slope and the very low supply of organic matter, available plant nutrients, and moisture.

Onsite investigation is generally needed before planning the use and reclamation of this unit.

This unit is not assigned to a capability subclass. Pacolet soil is in woodland group 4c.

Pt—Pits. This map unit consists of areas where all the soil material has been removed and the underlying material has been quarried for construction aggregate. Most of the quarrying is for gravel or crushed stone for use in road construction or other paving. The size of the excavated areas range from 4 to 200 acres.

These pits are from 10 to 175 feet deep. The sides are mostly steep to vertical. Included in mapping are small areas of water.

Most areas lack vegetation. The more shallow parts in some areas could be reclaimed if there is enough soil material to support plants. Reclaiming some of the deeper areas would be difficult.

Onsite investigation is generally needed before planning the reclamation and use of this unit.

This unit is not assigned to a capability subclass or woodland group.

UL—Udorthents, loamy. This map unit consists of areas where all of the original soil has been removed for use as fill material in construction. The exposed surface now consists mainly of highly weathered bedrock or the bedrock that had underlain the natural soil before it was

excavated. Areas range from 5 to 40 acres. The composition of this map unit is more variable than that of most other units in the survey area but has been controlled well enough to be interpreted for the expected use of the soils.

The cuts are 3 to 25 feet deep. They are level or gently sloping. The sides are very steep to nearly vertical.

Included in mapping are small undisturbed areas where there is a clayey subsoil and part of the loamy surface layer.

Most areas have been reclaimed and seeded to grass. A few are naturally reseeded in wild grasses, weeds, and shortleaf and Virginia pines. The potential is low for plants because of the low fertility, the low available water capacity, and the erodibility.

The potential for urban development varies. Many areas are graded along one side to the level of an adjoining roadway. The potential is high for industrial or commercial development. Some areas cut below the remaining original ground level have low potential for urban development.

Onsite investigation is generally needed before planning the reclamation and use of this unit.

This unit is not assigned to a capability subclass or woodland group.

UO—Udorthents, sanitary landfill. This map unit consists of areas where the natural soil has been altered by sanitary landfill. These are excavated areas where deeply graded trenches have been backfilled with alternated layers of solid refuse and soil material and covered with 2 to 3 feet of soil. After the final cover is added, the surface is nearly level to gently sloping. Areas range from 20 to 160 acres. The composition of this map unit is more variable than that of most other units in the survey area but has been controlled well enough to be interpreted for the expected use of the soils.

Included in areas still in use is a small acreage of undisturbed soil.

These areas have moderate potential for plant growth. Most are seeded to grass or planted to trees. Natural fertility and available water capacity are generally low. The erosion hazard is severe. A permanent plant cover is essential to protect these areas from erosion.

These areas are unsuitable for most building purposes because of subsidence and the danger of hazardous methane gas, which is produced in the landfill. The potential is moderate to high for most outdoor recreational activities.

Onsite investigation is needed before planning the use and management of this unit.

This unit is not assigned to a capability subclass or woodland group.

on slabs. The potential is high for paths and trails. It is low for playgrounds because of the slope and slow permeability. It is moderate for most other kinds of recreation because of the slope and slow permeability.

The capability subclass is IIIe. The woodland group is 3o.

WkB—Wilkes loam, 4 to 8 percent slopes. This well drained soil is on upland ridges. Mapped areas are on narrow ridges and range from 4 to 25 acres.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 8 inches thick. The upper part is strong brown clay, and the lower part is strong brown clay loam. The underlying material to a depth of 48 inches (fig. 6) is olive brown, green, and black sandy loam. Below this is dark colored hard rock.

Included with this soil in mapping are a few areas where the slope is less than 4 percent, a few areas where there is no clay subsoil, a few eroded areas where the surface layer is sandy clay loam, and a few small areas where the bedrock is less than 40 inches below the surface. Also included are some small areas of Enon and Iredell soils. The included soils, each less than 5 acres, make up about 10 to 20 percent of this map unit.

The organic matter content is low in the surface layer of this Wilkes soil. Permeability is moderately slow, the available water capacity is very low, the shrink-swell potential is moderate, and surface runoff is medium. The subsoil is slightly acid to mildly alkaline. Depth to hard bedrock range from 40 to 80 inches. The water table is below 6 feet.

Most of the acreage is used for crops, hay, and pasture. Some areas are used for woodland or residential development.

This soil has moderate potential for row crops, such as corn and soybeans, and moderate potential for hay, pasture, and small grain. The shape makes the hazard of erosion severe if these soils are used for row crops. Minimum tillage, the return of crop residue to the soil, and the use of cover crops, including grasses and legumes, reduce runoff and help to control erosion.

This soil has moderate potential for needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, and redcedar. The main understory species are dogwood, redbud, holly, sourwood, and black cherry. There are no significant limitations in woodland use or management.

The potential is moderate to low for most urban uses because of the depth to rock. The potential is low for playgrounds because of the slope, moderate for golf fairways because of the depth to bedrock, and high for most other uses.

The capability subclass is IVe. The woodland group is 4o.

WkD—Wilkes loam, 8 to 15 percent slopes. This well drained soil is on narrow ridges and side slopes of the uplands. Mapped areas are oval and range from 4 to 100 acres.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 8 inches thick. The upper part is strong brown clay, and the lower part is strong brown clay loam. The underlying material to a depth of 48 inches is olive brown, green, and black sandy loam. Below this is dark colored hard rock.

Included with this soil in mapping are a few areas where the slope is less than 8 percent, a few areas where there is no clay subsoil, a few eroded areas where the surface layer is sandy clay loam, and a few small areas where bedrock is less than 40 inches below the surface. Also included are some small areas of Enon and Mecklenburg soils. The included soils, each less than 5 acres, make up about 10 to 20 percent of this map unit.

The organic matter content is low in the surface layer of this Wilkes soil. Permeability is moderately slow, the available water capacity is very low, the shrink-swell potential is moderate, and surface runoff is rapid. The subsoil is slightly acid to mildly alkaline. Depth to hard bedrock ranges from 40 to 80 inches. The water table is below 6 feet.

Most of the acreage is used for hay and pasture. Some areas are woodland.

This soil has low potential for row crops, such as corn and soybeans, and moderate potential for hay, pasture, and small grain. Erosion is a hazard if cultivated crops are grown. Minimum tillage, the return of crop residue to the soil, and the use of cover crops, including grasses and legumes, help to control erosion in cultivated areas.

The potential is moderate for needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, and redcedar. The main understory species are dogwood, redbud, holly, sourwood, and black cherry. There are no significant limitations in woodland use and management.

This soil has moderate to low potential for most urban uses because of the slope and the depth to bedrock. The potential is high for paths and trails. It is low for playgrounds because of the slope. It is moderate for most other kinds of recreation because of the slope.

The capability subclass is VIe. The woodland group is 4o.

WkE—Wilkes loam, 15 to 25 percent slopes. This well drained soil is on side slopes adjacent to drainageways. Mapped areas are oblong and range from 6 to 200 acres.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 8 inches thick. The upper part is strong brown clay, and the lower part is strong

brown clay loam. The underlying material to a depth of 48 inches is olive brown, green, and black sandy loam. Below this is dark colored hard rock.

Included with this soil in mapping are a few areas where there is no clay subsoil, a few small eroded areas where the surface layer is sandy clay loam, and a few small areas where bedrock is less than 40 inches below the surface. Also included are some small areas of the

Pacolet soil. The included soils, each less than 5 acres, make up about 10 to 15 percent of this map unit.

The organic matter content is low in the surface layer of this Wilkes soil. Permeability is moderately slow, the available water capacity is very low, the shrink-swell potential is moderate, and surface runoff is rapid. The subsoil is slightly acid to mildly alkaline. Depth to hard bedrock ranges from 40 to 80 inches. The water table is below 6 feet.

Most of the acreage is woodland. Some areas are used for pasture.

This soil has low potential for crops and moderate potential for pasture. Good pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion. Pastures should be properly maintained to prevent the hazard of erosion.

The potential is moderate for needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, and redcedar. The main understory species are dogwood, redbud, holly, sourwood, and black cherry. The slope is the main limitation in woodland use and management.

This soil has low potential for most urban uses because of the slope and the depth to bedrock. The potential is low for most recreational uses because of the slope.

The capability subclass is VIIe. The woodland group is 4r.

WkF—Wilkes loam, 25 to 45 percent slopes. This well drained soil is on side slopes adjacent to major drainageways. Mapped areas are commonly oblong and range from 4 to 100 acres.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 8 inches thick. The upper part is strong brown clay, and the lower part is strong brown clay loam. The underlying material to a depth of 48 inches is olive brown, green, and black sandy loam. Below this is dark colored hard rock.

Included with this soil in mapping are a few areas where the slope is less than 25 percent, a few areas where there is no clay subsoil, a few eroded areas where the surface layer is clay loam, and a few small areas where bedrock is less than 40 inches below the surface. Also included are some small areas of the Pacolet soil. The included soils, each less than 5 acres, make up about 10 percent of this map unit.

The organic matter content is low in the surface layer of this Wilkes soil. Permeability is moderately slow, the available water capacity is very low, the shrink-swell potential is moderate, and surface runoff is rapid. The subsoil is slightly acid to mildly alkaline. Depth to hard bedrock ranges from 40 to 80 inches. The water table is below 6 feet.

Most of the acreage is woodland. Some areas are used for pasture.

This soil is not suited to crops because of the slope. It has moderate potential for pasture. Good pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion. Pastures should be properly maintained to prevent the hazard of erosion.

This soil has moderate potential for needleleaf trees. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, and redcedar. The main understory species are dogwood, redbud, holly, sourwood, and black cherry. The slope is the main limitation in woodland use and management.

This soil has low potential for most urban and recreational uses because of the slope and the depth to rock.

The capability subclass is VIIe. The woodland group is 4r.

WuD—Wilkes-Urban land complex, 8 to 15 percent slopes. This map unit consists of areas of Wilkes soils and areas of Urban land primarily in the suburban areas of Charlotte. These areas are too small and too intricately mixed to be mapped separately. The undisturbed Wilkes soil makes up 50 to 70 percent of each area, and Urban land makes up 15 to 35 percent. The rest of this unit consists of areas where most of the natural soil has been altered or covered as the result of grading and digging.

The undisturbed Wilkes soil is well drained. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 8 inches thick. The upper part is strong brown clay, and the lower part is strong brown clay loam. The underlying material to a depth of 48 inches is olive brown, green, and black sandy loam. Below this is dark colored hard rock.

The organic matter content is low in the surface layer. Permeability is moderately slow, the available water capacity is very low, the shrink-swell potential is moderate, and surface runoff is rapid. The subsoil is slightly acid to mildly alkaline. Depth to hard bedrock ranges from 40 to 80 inches. The water table is below 6 feet.

The Urban land part of this unit is covered mostly with paved streets, closely spaced houses, driveways, apartment complexes, schools, and churches.

In some altered, or disturbed, areas the Wilkes soil is covered with more than 20 inches of fill material. In others, more than two-thirds of the natural soil has been removed by cutting and grading.

Included with this unit in mapping are small areas of Enon and Mecklenburg soils.

Because of the slope and runoff, erosion is a hazard if these soils are disturbed for urban development. Also because of the slope, grading is needed for urbanization. The degree of grading limits urban development because of the depth to bedrock. Surface runoff from rooftops and paved surfaces causes an increased hazard of flooding in low-lying areas downstream.

Onsite investigation is generally needed before planning the use and management of this unit.

This unit is not assigned to a capability subclass or to a woodland group.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, and woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock,

wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

Albert B. Coffey, district conservationist, and personnel from the State Resource Conservationist's office, Soil Conservation Service, helped prepare this section.

According to the 1975 Land Utilization Summary compiled by the North Carolina Department of Agriculture, 164,314 acres in Mecklenburg County is farmland. Of this total, 110,631 acres is forest or idle cropland, 33,578 acres is open pasture, and 20,105 acres is cropland. Of the 20,105 acres of cropland, about 30 percent is used for hay, 21 percent for soybeans, 16 percent for corn or grain, 8 percent for corn or sorghum for silage, 13 percent for small grain, such as oats, wheat, and barley, and 12 percent for other crops.

More than 50 percent of the county is now in nonfarm use. The acreage in crops and pasture is gradually decreasing as farmland is abandoned or converted to urban development.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including system of land capability classification used by the Soil Conservation Service is explained; and the predicted yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to farmers, equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms, should also consider the detailed information given in the description of each soil.

Soil erosion is the major concern on most of the soils in Mecklenburg County. If slope is more than 2 percent, erosion is a hazard.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as the upland soils and on soils that are shallow to bedrock such as Goldston and Wilkes. Second, soil erosion on farmland results in sedimentation of streams.

Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, tilling or preparing a good seedbed is difficult on clayey spots because the original friable surface soil has been eroded away.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps vegetative cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soils. On livestock farms, the legume and grass forage crops in the cropping system reduce erosion on sloping land, also provide nitrogen, and improve tilth for the following crop.

Contour tillage and terracing are practical in most areas of gently sloping soils. Cropping systems that provide substantial vegetative cover are required to control erosion unless minimum tillage is practiced. Minimizing tillage and leaving crop residue on the surface help increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area, but they are more difficult to use successfully on the eroded soils and on the soils that have a clayey surface layer. No-till farming of corn is effective in reducing erosion on sloping land and can be adapted to most soils in the survey area. It is more difficult to practice successfully, however, on the soils that have a clayey surface layer.

Terraces and diversions reduce the length of slope and reduce runoff and erosion with slopes of 8 percent or less. They are not practical on steeper slopes or on shallow soils such as Wilkes or Goldston.

Contouring and contour stripcropping are widespread erosion control practices in the survey area. They are best adapted to soils that have smooth, uniform slopes.

Information for the design of erosion control practices for each kind of soil is contained in the Technical Guide, available in local offices of the Soil Conservation Service.

Soil drainage is a management need on some of the acreage used for crops and pasture in the survey area. Some soils are so wet that the production of crops common to the area is generally not feasible unless artificial drainage is installed. These are the somewhat poorly drained Monacan soils on the flood plains and the moderately well drained Helena, Iredell, and Lignum soils in upland positions and around the heads of drainageways.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage is needed in most areas of the somewhat poorly drained Monacan soils when used for intensive row cropping. Drains have to be more closely spaced in slowly permeable soils than in more permeable soils. Tile drainage is not feasible on the Helena, Lignum, or Iredell soils.

Soil fertility is naturally low in most soils on uplands in the survey area. Fertilizer and lime additions to all soils are necessary for economical crop production.

On all soils additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils with good tilth are granular and porous.

Many of the soils used for crops in the survey area have a high clay content in the surface layer and most are low in content of organic matter. Generally the structure of such soils is weak, and intense rainfall causes the formation of a crust on the surface. The crust is hard when dry and nearly impervious to water. Once the crust forms, it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material can help improve soil structure and reduce crust formation.

Field crops suited to the soils and climate of the survey area include some that are not now commonly grown such as cotton which at one time was the chief cash crop in the county. Corn and soybeans are now the principal row crops. Corn and grain sorghum for silage are the principal row crops for cattle feed.

Wheat, oats, and barley are the common close-growing crops grown for grain harvest while hay is the dominant crop grown overall.

Special crops grown commercially in the survey area are vegetables, small fruits, tree fruits, and nursery plants. A small acreage throughout the survey area is used for melons, strawberries, grapes, sweet corn, tomatoes, peppers, and other vegetables and small fruits.

Latest information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and

and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, and open ditches. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and small commercial buildings referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for

these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Lawns and landscaping require soils that are suitable for the establishment and maintenance of turf for lawns and ornamental trees and shrubs for landscaping. The best soils are firm after rains, are not dusty when dry, and absorb water readily and hold sufficient moisture for plant growth. The surface layer should be free of stones. If shaping is required, the soils should be thick enough over bedrock or hardpan to allow for necessary grading. In rating the soils, the availability of water for sprinkling is assumed.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow nox-

ious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, and determine the pH or reaction of the soil.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in

diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly silt loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (2) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (1).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 17. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These

indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also

influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Ultisols.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udults. (*Ud*, from Udic meaning not wet but in a humid climate).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Hapludults (*Hapl*, meaning simple horizons, plus *udult*, the suborder of Ultisols that have an udic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistency, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is clayey, kaolinitic, thermic Typic Hapludults.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistency, and mineral and chemical composition. An example is the Cecil series in the clayey, kaolinitic, thermic family of Typic Hapludults.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (3). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Appling series

The Appling series consists of well drained, moderately permeable soils that formed in residuum from acid igneous and metamorphic rock. These soils are on broad ridges and side slopes. Slope ranges from 2 to 15 percent.

Typical pedon of Appling sandy loam, 2 to 8 percent slopes, 0.5 mile north of South Carolina State Line on U.S. 521, 0.75 mile east of State Road 3632, 0.25 mile north on State Road 3635, 70 feet east in field:

- Ap—0 to 8 inches; yellowish brown (10YR 5/4) sandy loam; moderate fine granular structure; very friable; many fine and medium roots; medium acid; gradual wavy boundary.
- B1—8 to 11 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; friable; many fine roots; many fine and medium pores; strongly acid; abrupt smooth boundary.
- B21—11 to 16 inches; yellowish brown (10YR 5/8) clay; moderate medium subangular blocky structure; firm; few fine and medium roots; common medium pores; common prominent continuous clay films on faces of peds; strongly acid; gradual wavy boundary.
- B22t—16 to 29 inches; brownish yellow (10YR 6/8) clay; common medium prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; few fine and medium roots; common medium pores; common thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.
- B23t—29 to 43 inches; brownish yellow (10YR 6/6) clay; common medium prominent red (2.5YR 4/8) and few fine faint very pale brown mottles; weak medium subangular blocky structure; firm; few fine roots; few fine pores; few thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.
- C—43 to 66 inches; red (2.5YR 4/8), brownish yellow (10YR 6/8) and white (10YR 8/2) saprolite that

crushes to sandy clay loam; massive; firm; strongly acid.

The thickness of the clayey B horizon ranges from 24 to 46 inches. Depth to bedrock is more than 60 inches. The B horizon is strongly acid or very strongly acid.

The Ap horizon is yellowish brown, brown, or pale brown. The A2 horizon, where present, is light yellowish brown or brownish yellow.

The B1 horizon, where present, is brownish yellow or very pale brown sandy loam or sandy clay loam. The B2t horizon is yellowish brown, brownish yellow, strong brown, or yellowish red clay or sandy clay. The B3 horizon, where present, is mottled brownish yellow, strong brown, reddish yellow, and red clay loam or sandy clay loam.

The C horizon is commonly variegated yellowish red, reddish yellow, red, brownish yellow, yellowish brown, brown, white, and light gray saprolite that crushes to sandy loam or sandy clay loam.

Cecil series

The Cecil series consists of well drained, moderately permeable soils that formed in residuum from acid igneous and metamorphic rock. These soils are on broad ridges and side slopes. Slope ranges from 2 to 15 percent.

Typical pedon of Cecil sandy clay loam, 2 to 8 percent slopes, eroded, 2.6 miles north of I-85 on U.S. 21, 0.4 mile west of junction of N.C. 115 on Sunset Road (State Road 2108), 25 feet southeast at intersection of State Road 2100:

- Ap—0 to 6 inches; yellowish red (5YR 4/6) sandy clay loam; weak fine granular structure; friable; few to common fine roots; common fine pores; medium acid; clear smooth boundary.
- B21t—6 to 18 inches; red (2.5YR 4/6) clay; moderate fine subangular blocky structure; firm; few to common fine roots; common fine pores; thin continuous clay films on faces of peds; strongly acid; clear smooth boundary.
- B22t—18 to 35 inches; red (2.5YR 4/6) clay; common fine distinct brownish yellow mottles; moderate fine subangular blocky structure; firm; few fine pores; thin distinct continuous clay films on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.
- B23t—35 to 46 inches; red (2.5YR 4/6) clay; common fine distinct brownish yellow mottles; weak fine subangular blocky structure; firm; faint discontinuous clay films on faces of peds; few fine flakes of mica; few fine pockets of saprolite; strongly acid; clear wavy boundary.
- B3—46 to 53 inches; red (2.5YR 4/6) clay loam; common fine distinct brownish yellow mottles; weak fine subangular blocky structure; firm; few flakes of

mica; common pockets of saprolite; strongly acid; gradual wavy boundary.

C—53 to 65 inches; red and yellow saprolite that crushes to loam; massive; friable; strongly acid.

Thickness of the clayey B horizon ranges from 24 to 44 inches. Depth to bedrock is more than 60 inches. The B horizon is strongly acid or very strongly acid.

The Ap horizon is yellowish brown, brown, yellowish red, red, or reddish brown.

The B1 horizon, if present, is sandy clay loam or clay loam. The B2t horizon is red clay, and in some places it has brownish yellow, yellowish brown, reddish yellow, or strong brown mottles in the lower part. The B3 horizon is sandy clay loam or clay loam.

The C horizon is strong brown, red, or yellow saprolite that crushes to loam or clay loam.

Davidson series

The Davidson series consists of well drained, moderately permeable soils that formed in materials weathered from dark colored rocks high in ferromagnesian minerals. These soils occur on broad ridges and narrow side slopes. Slope ranges from 2 to 25 percent.

Typical pedon of Davidson sandy clay loam, 2 to 8 percent slopes, 1 mile south of Shopton on N.C. 160, 3 miles southwest of State Road 1116, 1.3 miles west on State Road 1115, 50 feet southwest of junction of State Road 1378:

- Ap—0 to 7 inches; dark reddish brown (2.5YR 3/4) sandy clay loam, moderate fine granular structure; friable; medium acid; gradual smooth boundary.
- B1—7 to 16 inches; dark red (2.5YR 3/6) clay loam; weak fine subangular blocky structure; friable; medium acid; gradual wavy boundary.
- B21t—16 to 43 inches; dark red (2.5YR 3/6) clay; weak fine subangular blocky structure; firm, sticky, slightly plastic; common fine quartz grains; strongly acid; gradual wavy boundary.
- B22t—43 to 103 inches; dark red (2.5YR 3/6) clay; small pockets of clay loam and loam throughout the horizon; weak fine subangular blocky structure; friable, slightly plastic; few to common fine quartz grains; strongly acid.

The clayey textured horizons commonly extend 60 to 100 inches or more. Depth to bedrock is more than 60 inches. The B horizon ranges from very strongly acid to medium acid.

The Ap horizon is dusky red, very dusky red, dark reddish brown, or dark red.

The B1 horizon, where present, is dark red or dark reddish brown. The B2t horizon is dark red, dark reddish brown, or dusky red. In some places the B23t horizon and the lower B2t horizons are red. Structure ranges from weak to moderate subangular blocky.

10YR 5/6) and common fine distinct mottles; massive; firm, slightly sticky, common fine flakes of mica; strongly wavy boundary.

es; light gray (5Y 7/1) saprolite that clayey clay loam; common fine strong massive; friable; very strongly acid.

clayey B horizon ranges from 12 to rippable bedrock is 40 to 60 inches. very strongly acid or strongly acid. zone is light olive brown, dark grayish brown. The A2 horizon, if present, is grayish brown.

brownish yellow or yellowish brown clay loam. The B2t horizon is yellowish yellow, or strong brown sandy clay chroma or less are in the upper 24 inches. The B3 horizon, if present, has some of the B2t horizon and is clay loam.

commonly light gray or variegated yellowish red, strong brown, or gray s to loamy sand, sandy loam, sandy clay.

consists of moderately well drained, soils that formed in residuum from schist. These soils are on broad flat gently sloping areas on the uplands. to 8 percent.

Iredell fine sandy loam, 1 to 8 percent of Pineville on N.C. 51, 1.5 miles S 3687, 400 yards east of road:

olive brown (2.5Y 4/4) fine sandy medium granular structure; friable; common fine manganese concretions; abrupt smooth boundary.

es; light olive brown (2.5Y 5/4) clay; medium columnar structure parting to medium angular blocky; very firm, very plastic; few fine roots; few fine manganese; common distinct clay films on primary faces of peds; common slickensided faces; neutral; gradual smooth

es; light olive brown (2.5Y 5/4) clay; medium columnar structure parting to medium angular blocky; very firm, very sticky, common distinct clay films on primary faces of peds; common slickensided faces; common fine crystals of feldspar and black minerals; mildly alkaline; gradual.

B3—24 to 28 inches; light olive brown (2.5Y 5/4) clay loam; weak medium subangular blocky structure; firm, sticky, plastic; common fine crystals of feldspar; common green minerals; common pockets of saprolite; mildly alkaline; gradual wavy boundary.

C1—28 to 40 inches; light olive brown (2.5Y 5/4) saprolite that crushes to loam; massive; friable; few pockets of clay loam; common fine black minerals; mildly alkaline; gradual wavy boundary.

C2—40 to 65 inches; olive (5Y 4/4) saprolite that crushes to loam; massive; friable; few pockets of clay loam; few fine flakes of mica; many fine black and green minerals; mildly alkaline.

Thickness of the clayey B horizon ranges from 11 to 24 inches. Depth to bedrock is more than 60 inches. The B horizon ranges from slightly acid to mildly alkaline.

The Ap horizon is dark grayish brown, very dark grayish brown, dark brown, or olive brown.

The B1 horizon, where present, is yellowish brown, dark yellowish brown, light olive brown, or light yellowish brown clay loam, sandy clay, or sandy clay loam. The B2t horizon is yellowish brown or light olive brown. The B3 horizon is olive brown, light olive brown, yellowish brown, or olive clay loam or sandy clay loam.

The C horizon is variegated in colors of light olive brown, brown, yellowish brown, light gray, yellow, or olive saprolite that crushes to sandy loam, sandy clay loam, loam, or loamy sand.

Lignum series

The Lignum series consists of moderately well drained, slowly permeable soils that formed in residuum from fine grained schist or slate rock. These soils are on gentle slopes of interstream divides and around the heads of drainageways. Slope ranges from 2 to 8 percent.

Typical pedon of Lignum gravelly silt loam, 2 to 8 percent slopes, 4 miles east of Mint Hill on Brief Road, 0.3 mile south on State Road 3107; 500 feet west of road, through woods, in a cleared field:

Ap—0 to 5 inches; yellowish brown (10YR 5/4) gravelly silt loam; weak medium granular structure; friable; many fine roots; very strongly acid; abrupt smooth boundary.

B1—5 to 11 inches; brownish yellow (10YR 6/6) silty clay loam; weak fine subangular blocky structure; friable; common fine roots; few fine pores; strongly acid; clear smooth boundary.

B21t—11 to 15 inches; strong brown (7.5YR 5/8) clay; common medium distinct yellow (10YR 7/6) mottles; moderate fine subangular blocky structure; firm, plastic, slightly sticky; few fine roots; few fine pores; thin discontinuous clay films on faces of peds; few fine pebbles; strongly acid; gradual wavy boundary.

B22t—15 to 28 inches; yellowish brown (10YR 5/6) clay; common fine and medium distinct light gray (10YR

7/1) and common medium distinct olive yellow (2.5YR 6/6) mottles; moderate fine angular blocky structure; very firm, plastic, slightly sticky; few fine pores; thin continuous clay films on faces of peds; few fine pebbles; strongly acid; gradual wavy boundary.

B23t—28 to 37 inches; reddish yellow (7.5YR 6/8) clay; many medium distinct light gray (5Y 7/2) mottles; weak fine angular blocky structure; very firm, plastic, slightly sticky; very strongly acid; abrupt smooth boundary.

Cr—37 to 50 inches; mottled yellow and gray saprolite that crushes to silt; 75 percent by volume brittle slate fragments; very strongly acid; abrupt boundary.

R—50 to 52 inches; hard slate rock.

Thickness of the clayey B horizon is less than 30 inches. Depth to bedrock ranges from 48 to 72 inches. Reaction in the B horizon is strongly acid or very strongly acid.

The Ap horizon is yellowish brown, pale brown, or grayish brown.

The B1 horizon is strong brown, brownish yellow, or light yellowish brown silt loam or silty clay loam. The B2t horizon is strong brown, reddish yellow, or yellowish brown clay or silty clay. Mottles of chroma 2 or less range from few to common in the lower B2t horizon. The B3 horizon, if present, is clay loam or silty clay loam.

The C horizon is mottled yellow and gray silt loam or silt. It is 15 to 80 percent weathered slate fragments in the lower part.

Mecklenburg series

The Mecklenburg series consists of well drained, slowly permeable soils that formed in residuum from basic igneous and metamorphic rocks. These soils are on broad ridges and side slopes. Slope ranges from 2 to 15 percent.

Typical pedon of Mecklenburg fine sandy loam, 2 to 8 percent slopes, approximately 9 miles southwest of Charlotte on N.C. 49, 0.8 mile south on State Road 1122, 40 feet west of road:

Ap—0 to 7 inches; dark reddish brown (5YR 3/4) fine sandy loam; moderate fine granular structure; friable; few fine roots; few fine pores; common fine manganese concretions; neutral; clear smooth boundary.

B21t—7 to 15 inches; yellowish red (5YR 4/6) clay; moderate fine subangular blocky structure; very firm, sticky, plastic; common fine roots; few fine pores; common fine manganese concretions; common thin distinct continuous clay films on faces of peds; neutral; gradual wavy boundary.

B22t—15 to 22 inches; yellowish red (5YR 4/6) clay; common medium distinct strong brown (7.5YR 5/8) mottles; moderate fine subangular blocky structure; very firm, plastic; few fine roots; common light and

dark colored minerals; thin continuous clay films on faces of peds; common fine manganese concretions; slightly acid; gradual wavy boundary.

B3—22 to 34 inches; yellowish red (5YR 4/6) clay; many coarse distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; firm; few fine manganese concretions; common pockets of saprolite; few fine flakes of mica; slightly acid; gradual wavy boundary.

C1—34 to 45 inches; mottled strong brown (7.5YR 5/8) and yellowish red (5YR 4/6) saprolite that crushes to clay loam; massive; friable, slightly sticky, slightly plastic; common fine flakes of mica; slightly acid; diffuse boundary.

C2—45 to 65 inches; very dark grayish brown (2.5Y 3/2) and light olive brown (2.5Y 5/4) saprolite that crushes to loam; massive; friable; few pockets of strong brown clay in upper 10 inches; common fine flakes of mica; neutral.

Thickness of the clayey B horizon is less than 32 inches. Depth to bedrock ranges from 48 to 60 inches. Reaction in the B horizon ranges from medium acid to neutral.

The Ap horizon is reddish brown, dark reddish brown, brown, or yellowish red.

The B2t horizon is red or yellowish red and has few to common brown to red mottles in the lower part. The B3 horizon, if present, is strong brown or yellowish red.

The C horizon is commonly variegated red, yellow, brown, gray, and black saprolite that crushes to loam, sandy loam, sandy clay loam, or clay loam.

Monacan series

The Monacan series consists of somewhat poorly drained, moderately permeable soils that formed in recent alluvium. These soils are on flood plains adjacent to streams. The width of the flood plain varies. Map units are commonly long and narrow. Slope ranges from 0 to 2 percent.

Typical pedon of Monacan loam in Long Creek Community, 700 feet south Beatties Ford Road bridge, 250 feet east of the channel of Long Creek in pasture:

Ap—0 to 7 inches; brown (7.5YR 4/4) loam; moderate medium granular structure; friable; many fine roots; neutral; clear smooth boundary.

B1—7 to 14 inches; yellowish red (5YR 4/6) loam; common fine distinct light olive brown and brownish yellow mottles; weak fine subangular blocky structure; friable; common fine roots; common medium pores; neutral; clear smooth boundary.

B21—14 to 21 inches; brown (7.5YR 4/4) silty clay loam; common medium distinct olive gray (5Y 5/2) mottles; weak fine subangular blocky structure; friable; common fine roots; common medium pores; few

common fine distinct yellow mottles; moderate coarse subangular blocky structure; very firm, sticky, plastic, common fine and medium roots; common fine pores; prominent patchy clay films on faces of pedis; very strongly acid; gradual wavy boundary.

B3—26 to 33 inches; strong brown (7.5YR 5/6) clay; common medium prominent red (2.5YR 4/6) and common fine distinct yellow mottles; weak medium subangular blocky structure; firm, slightly sticky, plastic; common fine and medium roots; common fine pores; prominent patchy clay films on faces of pedis; few pockets of C material; very strongly acid; **gradual wavy boundary.**

C1—33 to 38 inches; mottled yellow, strong brown, and red saprolite that crushes to clay loam; rock structure; firm; few medium roots; few root casts, coated with clay; very strongly acid; gradual wavy boundary.

C2—38 to 50 inches; weathered saprolite that crushes to loam; friable; very strongly acid.

The thickness of the clayey B horizon is less than 36 inches. Depth to bedrock is more than 60 inches. The B horizon is strongly acid or very strongly acid.

The Ap horizon is brown or yellowish brown. The A2 horizon is light yellowish brown or brownish yellow sandy loam or fine sandy loam.

The B1 horizon, where present, is yellowish brown or yellowish red. The B2t horizon is yellowish brown, strong brown, or yellowish red sandy clay, clay loam, or clay. The B3 horizon, where present, is yellowish brown, brownish yellow, or strong brown clay or clay loam.

The C horizon is commonly variegated in colors of yellow, strong brown, and red saprolite that crushes to clay loam or loam.

Wilkes series

The Wilkes series consists of well drained, moderately slowly permeable soils. These soils formed in residuum from diorite, hornblende schist, and related rocks that are moderately high in ferromagnesian minerals or from a mixture of acidic and basic rocks. They are on ridges and narrow side slopes. Slope ranges from 4 to 45 percent.

Typical pedon of Wilkes loam, 4 to 8 percent, approximately 1 mile north of N.C. 49 at University of North Carolina at Charlotte on State Road 2833, 60 feet north of road in woods:

O1—1 inch to 0; undecomposed mixed hardwood and pine litter.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam; moderate fine granular structure; friable; many fine and medium roots; few fine flakes of mica; slightly acid; clear smooth boundary.

A2—4 to 7 inches; brown (10YR 5/3) loam; moderate fine granular structure; friable; many fine roots; few

fine flakes of mica; slightly acid; clear smooth boundary.

B2t—7 to 13 inches; strong brown (7.5YR 5/6) clay; weak prismatic structure parting to moderate medium angular blocky; very firm, sticky plastic; few fine roots; few fine flakes of mica; few green and black minerals; slightly acid; gradual wavy boundary.

B3—13 to 15 inches; strong brown (7.5YR 5/6) clay loam; massive; firm; common fine flakes of mica; many green, black, and light colored minerals; 25 to 35 percent saprolite; slightly acid; clear wavy boundary.

Cr—15 to 45 inches; olive brown, green, and black saprolite that crushes to sandy loam; massive; friable; common fine flakes of mica; slightly acid; clear wavy boundary.

R—45 to 48 inches; hard, slightly weathered dark rock; very difficult to rip with auger; slightly acid.

The thickness of the clayey B horizon is less than 10 inches. Depth to bedrock ranges from 40 to 80 inches. The B horizon ranges from slightly acid to mildly alkaline.

The A1 or Ap horizon is dark grayish brown, brown, dark yellowish brown, or light olive brown. The A2 horizon is brown or light yellowish brown.

The B2t horizon is yellowish brown, dark yellowish brown, brownish yellow, or strong brown clay or clay loam. The B3 horizon, if present, is strong brown or yellowish brown.

The C horizon is commonly variegated yellowish brown, strong brown, olive brown, green, black, and gray saprolite that crushes to loam or sandy loam.

Formation of the soils

The following paragraphs describe the factors of soil formation and relate them to the soils of Mecklenburg County.

Factors of soil formation

Factors that contribute to differences among soils are the climate, the plant and animal life, the parent material, the relief, and time. Climate and plant and animal life, particularly plants, are the active forces in soil formation. Their effect on parent material is modified by the topography and by the length of time the parent material has been in place. The relative importance of each factor differs from place to place. In some places one factor dominates in the formation of a soil and determines most of its properties. In most places, however, the interaction of all factors determines the kind of soil that develops in any given place.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a “wire” when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer

within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in “hillpeats” and “climatic moors.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A₂ horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *-prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt*, *silt loam*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.
Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Wetness. General term used for soils that have a seasonal high water table.

ILLUSTRATIONS



Figure 1.—Appling sandy loam, one of the best agricultural soils in the county. Contouring minimizes the risk of erosion and increases the infiltration of water.



Figure 2.—Hay on Cecil sandy clay loam, 2 to 8 percent slopes, eroded. Hay is about one-third of all the harvested cropland acreage in the county.



Figure 3.—Cecil-Urban land complex. Cecil soils are the open areas between the houses.



Figure 4.—Pasture of fescue-ladino clover on Iredell fine sandy loam. The slow internal water movement and plastic clay in the subsoil are limitations to intensive cultivation.



Figure 5.—Cleared or graded areas of this sloping clayey soil are extremely erodible. Maintaining a good plant cover is essential in preventing soil loss.



Figure 6.—Depth to bedrock is commonly 10 to 20 inches in Wilkes soils. The upper 2 to 5 feet of this bedrock zone is highly weathered and readily fractured. Plant roots penetrate this zone.



Figure 7.—Desilting basin on erodible Cecil soils. This basin trapped most of the sediment washed from the recently completed industrial site.

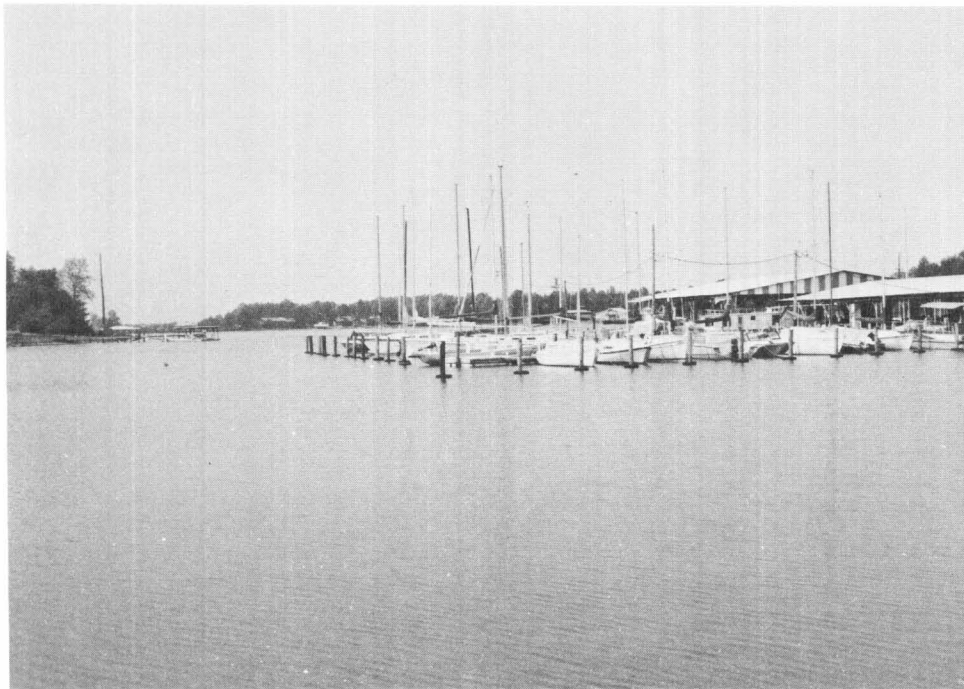


Figure 8.—Lake Norman provides numerous private and public marinas for boat docking and launching.

TABLES

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature ¹		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 29	April 5	April 19
2 years in 10 later than--	March 20	March 31	April 13
5 years in 10 later than--	March 3	March 22	April 3
First freezing temperature in fall:			
1 year in 10 earlier than--	November 9	October 31	October 19
2 years in 10 earlier than--	November 15	November 4	October 24
5 years in 10 earlier than--	November 27	November 11	November 2

¹Recorded in the period 1951-75
at Charlotte, N.C.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season ¹		
	Higher than 24° F <u>Days</u>	Higher than 28° F <u>Days</u>	Higher than 32° F <u>Days</u>
9 years in 10	237	218	192
8 years in 10	248	223	199
5 years in 10	269	233	212
2 years in 10	290	243	225
1 year in 10	301	248	232

¹Recorded in the period 1951-75
at Charlotte, N.C.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
ApB	Appling sandy loam, 2 to 8 percent slopes-----	2,786	0.8
ApD	Appling sandy loam, 8 to 15 percent slopes-----	1,405	0.4
CeB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded-----	91,811	27.3
CeD2	Cecil sandy clay loam, 8 to 15 percent slopes, eroded-----	26,354	7.9
CuB	Cecil-Urban land complex, 2 to 8 percent slopes-----	30,052	9.0
CuD	Cecil-Urban land complex, 8 to 15 percent slopes-----	2,818	0.8
DaB	Davidson sandy clay loam, 2 to 8 percent slopes-----	2,829	0.8
DaD	Davidson sandy clay loam, 8 to 15 percent slopes-----	951	0.3
DaE	Davidson sandy clay loam, 15 to 25 percent slopes-----	780	0.2
EnB	Enon sandy loam, 2 to 8 percent slopes-----	16,950	5.1
EnD	Enon sandy loam, 8 to 15 percent slopes-----	9,532	2.8
GeB2	Georgeville silty clay loam, 2 to 8 percent slopes, eroded-----	2,324	0.7
GeD2	Georgeville silty clay loam, 8 to 15 percent slopes, eroded-----	1,051	0.3
GoB	Goldston slaty silt loam, 2 to 8 percent slopes-----	394	0.1
GoD	Goldston slaty silt loam, 8 to 15 percent slopes-----	345	0.1
HeB	Helena sandy loam, 2 to 8 percent slopes-----	10,451	3.1
HuB	Helena-Urban land complex, 2 to 8 percent slopes-----	1,761	0.5
IrA	Iredell fine sandy loam, 0 to 1 percent slopes-----	3,283	1.0
IrB	Iredell fine sandy loam, 1 to 8 percent slopes-----	13,656	4.1
IuB	Iredell-Urban land complex, 0 to 8 percent slopes-----	2,304	0.7
LgB	Lignum gravelly silt loam, 2 to 8 percent slopes-----	603	0.2
MeB	Mecklenburg fine sandy loam, 2 to 8 percent slopes-----	15,714	4.7
MeD	Mecklenburg fine sandy loam, 8 to 15 percent slopes-----	4,885	1.5
MkB	Mecklenburg-Urban land complex, 2 to 8 percent slopes-----	4,482	1.3
MO	Monacan soils-----	21,003	6.2
MS	Monacan soils and Arents-----	1,483	0.4
PaE	Pacolet sandy loam, 15 to 25 percent slopes-----	10,812	3.2
PaF	Pacolet sandy loam, 25 to 45 percent slopes-----	3,238	1.0
PB3	Pacolet-Udorthents complex, gullied-----	325	0.1
Pt	Pits-----	751	0.2
UL	Udorthents, loamy-----	479	0.1
UO	Udorthents, sanitary landfill-----	270	0.1
Ur	Urban land-----	12,767	3.8
VaB	Vance sandy loam, 2 to 8 percent slopes-----	3,909	1.2
VaD	Vance sandy loam, 8 to 15 percent slopes-----	820	0.2
WkB	Wilkes loam, 4 to 8 percent slopes-----	6,881	2.0
WkD	Wilkes loam, 8 to 15 percent slopes-----	10,370	3.1
WkE	Wilkes loam, 15 to 25 percent slopes-----	10,538	3.1
WkF	Wilkes loam, 25 to 45 percent slopes-----	1,317	0.4
WuD	Wilkes-Urban land complex, 8 to 15 percent slopes-----	1,161	0.3
	Water-----	2,885	0.9
	Total-----	336,530	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Corn silage	Soybeans	Wheat	Oats	Grass- legume hay	Pasture
	<u>Bu</u>	<u>Ton</u>	<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Ton</u>	<u>AUM*</u>
ApB----- Appling	95	17	35	45	85	4.8	8.0
ApD----- Appling	70	15	25	35	75	4.2	7.0
CeB2----- Cecil	75	17	35	40	70	4.2	5.5
CeD2----- Cecil	65	13	25	35	65	4.0	4.5
CuB----- Cecil	---	---	---	---	---	---	---
CuD----- Cecil	---	---	---	---	---	---	---
DaB----- Davidson	100	19	40	50	85	5.0	8.0
DaD----- Davidson	75	15	35	40	75	4.0	7.5
DaE----- Davidson	---	---	---	---	---	---	6.0
EnB----- Enon	75	17	30	40	75	5.0	8.0
EnD----- Enon	65	13	25	40	65	4.8	7.5
GeB2----- Georgeville	75	17	35	40	65	5.0	6.0
GeD2----- Georgeville	65	13	30	35	60	4.0	5.0
GoB----- Goldston	55	---	20	25	---	3.0	4.5
GoD----- Goldston	---	---	---	---	---	2.1	3.5
HeB----- Helena	75	15	30	40	65	3.5	5.8
HuB----- Helena	---	---	---	---	---	---	---
IrA----- Iredell	70	15	30	45	55	5.0	8.0
IrB----- Iredell	65	15	---	---	65	5.0	8.0
IuB----- Iredell	---	---	---	---	---	---	---
LgB----- Lignum	90	20	35	45	55	3.0	7.0

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Soybeans	Wheat	Oats	Grass- legume hay	Pasture
	<u>Bu</u>	<u>Ton</u>	<u>Bu</u>	<u>Bu</u>	<u>Bu</u>	<u>Ton</u>	<u>AUM*</u>
MeB----- Mecklenburg	90	19	35	40	70	4.5	6.0
MeD----- Mecklenburg	70	14	30	30	60	3.5	5.0
MkB----- Mecklenburg	---	---	---	---	---	---	---
MO----- Monacan	100	---	35	50	50	3.5	7.5
MS----- Monacan	---	---	---	---	---	---	---
PaE----- Pacolet	---	---	---	---	---	---	---
PaF----- Pacolet	---	---	---	---	---	---	---
PB3----- Pacolet	---	---	---	---	---	---	---
Pt**. Pits							
UL**, UO**. Udorthents							
Ur**. Urban land							
VaB----- Vance	80	17	35	45	60	4.5	7.5
VaD----- Vance	70	14	30	40	55	4.2	7.0
WkB----- Wilkes	65	13	25	35	45	4.0	7.5
WkD----- Wilkes	50	12	20	30	40	3.7	7.0
WkE, WkF----- Wilkes	---	---	---	---	---	3.5	6.5
WuD----- Wilkes	---	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

** See map unit description for the composition and behavior characteristics of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry indicates that it is not applicable to rate the soils for the features shown on this table]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
ApB, ApD----- Appling	3o	Slight	Slight	Slight	-----	Loblolly pine----- Shortleaf pine----- Scarlet oak----- Southern red oak---- Virginia pine----- White oak----- Yellow-poplar-----	81 65 68 76 74 71 90	Eastern redcedar, eastern white pine, loblolly pine, yellow-poplar.
CeB2, CeD2----- Cecil	4c	Moderate	Moderate	Moderate	-----	Loblolly pine----- Shortleaf pine----- Virginia pine-----	72 66 65	Loblolly pine, Virginia pine.
DaB, DaD----- Davidson	3c	Moderate	Slight	Slight	-----	Loblolly pine----- Shortleaf pine----- Northern red oak---- Southern red oak---- Sweetgum----- White oak----- Yellow-poplar-----	81 68 86 72 80 71 80	Loblolly pine, yellow-poplar.
DaE----- Davidson	3r	Moderate	Moderate	Slight	-----	Loblolly pine----- Shortleaf pine----- Northern red oak---- Southern red oak---- Sweetgum----- White oak----- Yellow-poplar-----	81 68 86 72 80 71 80	Loblolly pine, yellow-poplar.
EnB, EnD----- Enon	4c	Moderate	Moderate	Moderate	-----	Loblolly pine----- Shortleaf pine----- Virginia pine-----	71 60 65	Eastern redcedar, loblolly pine, Virginia pine.
GeB2, GeD2----- Georgeville	4c	Moderate	Moderate	Moderate	-----	Loblolly pine----- Longleaf pine-----	70 60	Loblolly pine, Virginia pine.
GoB, GoD----- Goldston	4o	Slight	Slight	Slight	-----	Loblolly pine----- Longleaf pine----- Shortleaf pine----- Southern red oak---- White oak-----	73 68 63 66 69	Eastern redcedar, loblolly pine, Virginia pine.
HeB----- Helena	3w	Slight	Moderate	Slight	-----	Loblolly pine----- Shortleaf pine----- White oak----- Yellow-poplar-----	80 63 64 87	Loblolly pine, Virginia pine, yellow-poplar.
IrA, IrB----- Iredell	4c	Slight	Moderate	Moderate	-----	Loblolly pine----- Shortleaf pine----- Post oak----- White oak-----	67 58 44 47	Loblolly pine, eastern redcedar.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
LgB----- Lignum	3w	Slight	Moderate	Moderate	-----	Virginia pine----- Shortleaf pine----- Northern red oak----	74 66 68	Loblolly pine, Virginia pine.
MeB, MeD----- Mecklenburg	4o	Slight	Slight	Slight	-----	Loblolly pine----- Shortleaf pine----- Southern red oak---- Sweetgum----- White oak----- Yellow-poplar----- Eastern redcedar----	75 67 75 82 71 89 ---	Loblolly pine, Virginia pine, yellow-poplar, eastern redcedar.
MO, MS*----- Monacan	1c	Slight	Moderate	Slight	-----	Yellow-poplar----- Loblolly pine----- White oak-----	100 95 90	Loblolly pine, yellow-poplar.
PaE, PaF----- Pacolet	3r	Moderate	Moderate	Slight	-----	Loblolly pine----- Shortleaf pine----- Yellow-poplar-----	78 70 90	Loblolly pine, shortleaf pine, yellow-poplar.
PB3*: Pacolet-----	4c	Severe	Severe	Severe	-----	Loblolly pine----- Shortleaf pine-----	70 60	Loblolly pine, shortleaf pine,
VaB, VaD----- Vance	3o	Slight	Slight	Slight	-----	Loblolly pine----- Northern red oak---- Shortleaf pine----- White oak-----	76 --- --- ---	Loblolly pine, Virginia pine, yellow-poplar.
WkB, WkD----- Wilkes	4o	Slight	Slight	Slight	-----	Loblolly pine----- Post oak----- Shortleaf pine----- Southern red oak---- Sweetgum-----	75 79 63 76 82	Eastern redcedar, loblolly pine, Virginia pine.
WkE, WkF----- Wilkes	4r	Moderate	Moderate	Slight	-----	Loblolly pine----- Post oak----- Shortleaf pine----- Southern red oak---- Sweetgum-----	75 79 63 76 82	Loblolly pine, Virginia pine, eastern redcedar.

* See map unit description for the composition and behavior characteristics of the map unit.

TABLE 7.--SUITABLE LANDSCAPE PLANTS AND TREES--Continued

Soil name and map symbol	Shrubs		Ground covers	Grasses	Trees	
	Evergreen	Deciduous			Deciduous	Evergreen
GeB2, GeD2---- Georgeville	Aucuba, azalea, boxwood, camellia, cleysera, gardenia, Japanese hollies, juniper, ligustrum (privet), nandina, photinia, pyracantha, rhododendron, yucca.	Althea (hibiscus), blueberry (rabbiteye), clematis, hydrangea (blue), hydrangea (pink), lilac, roses, spirea.	Ajuga, day lily, ivy, creeping juniper, liriope, pachysandra, periwinkle.	Annual ryegrass, bermudagrass, fescue (Ky.31), zoysia.	Green ash, American beech, river birch, blackgum, black cherry, Japanese cherry, yoshino cherry, crab apple, dogwood, gingko, hawthorn, hickory, honeylocust (thornless), saucer magnolia, red maple, sugar maple, crape myrtle, oak, Bradford pear, pecan, persimmon, Lombardy poplar, yellow-poplar, golden raintree, redbud, sourwood, sweetgum, sycamore, black walnut, weeping willow.	Deodara cedar, eastern redcedar, Carolina hemlock, American holly, Carolina cherry, laurel, southern magnolia, loblolly pine, shortleaf pine, Virginia pine, white pine.
GoB, GoD----- Goldston	Aucuba, azalea, boxwood, camellia, cleysera, gardenia, Japanese hollies, Chinese hollies, juniper, ligustrum, nandina, photinia, pyracantha, rhododendron, yucca.	Althea (hibiscus), blueberry (rabbiteye), clematis, hydrangea (blue), hydrangea (pink), lilac, spirea.	Ajuga, day lily, ivy, creeping juniper, liriope periwinkle.	Annual ryegrass, bermudagrass, fescue (Ky.31), zoysia.	Green ash, American beech, river birch, Japanese cherry, dogwood, gingko, hawthorn, hickory, honeylocust (thornless), saucer magnolia, red maple, sugar maple, crape myrtle, oak, Bradford pear, Lombardy poplar, yellow-poplar, golden raintree, eastern redbud, sourwood, sweetgum, yoshino cherry.	Deodara cedar, eastern redcedar, Carolina hemlock, American holly, cherry, laurel, southern magnolia, loblolly pine, shortleaf pine, Virginia pine.

See footnotes at end of table.

TABLE 7.--SUITABLE LANDSCAPE PLANTS AND TREES --Continued

Soil name and map symbol	Shrubs		Ground covers	Grasses	Trees	
	Evergreen	Deciduous			Deciduous	Evergreen
VaB, VaD----- Vance	Aucuba, azalea, boxwood, camellias, cleysera, gardenia, Japanese hollies, juniper, ligustrum (privet), nandina, photinia, rhododendron, yucca, Chinese hollies.	Althea (hibiscus), blueberry (rabbiteye), clematis, hydrangea (blue), hydrangea (pink), lilac, roses, spirea.	Ajuga, day lily, ivy, creeping juniper, liriope, pachysandra, periwinkle.	Annual ryegrass, bermudagrass, fescue (Ky.31), zoysia.	Green ash, American beech, river birch, blackgum, black cherry, gingko, hawthorn, hickory, red maple, sugar maple, oak, Lombardy poplar, sweetgum, sycamore, black walnut, weeping willow.	Eastern redcedar, loblolly pine, shortleaf pine, Virginia pine.
WkB, WkD, WkE, WkF, WuD ² ----- Wilkes	Aucuba, boxwood, cleysera, gardenia, Japanese hollies, juniper, ligustrum, nandina, photinia, pyracantha, yucca.	Althea (hibiscus), clematis, hydrangea (pink), lilac, spirea.	Ajuga, day lily, ivy, creeping juniper, liriope, pachysandra, periwinkle.	Annual ryegrass, bermudagrass, fescue (Ky.31), zoysia.	Green ash, American beech, river birch, blackgum, black cherry, gingko, hawthorn, hickory, red maple, sugar maple, oak, pecan, persimmon, Lombardy poplar, yellow-poplar, sourwood, sweetgum, sycamore, black walnut, weeping willow.	Eastern redcedar, loblolly pine, shortleaf pine, Virginia pine.

¹Urban land part and pits not rated.

²These highly disturbed soils generally consist of compacted, dense fill material or steep gullies that have cut completely through the original soil. Low available moisture capacity severely restricts the kinds of plants that can be grown. The gullies are subject to excessive runoff.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ApB----- Appling	Moderate: too clayey.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
ApD----- Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
CeB2----- Cecil	Moderate: too clayey.	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength.	Moderate: too clayey.
CeD2----- Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.	Moderate: slope.
CuB*: Cecil----- Urban land.	Moderate: too clayey.	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength.	Moderate: too clayey.
CuD*: Cecil----- Urban land.	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.	Moderate: slope.
DaB----- Davidson	Moderate: too clayey.	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength.	Slight.
DaD----- Davidson	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.	Moderate: slope.
DaE----- Davidson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EnB----- Enon	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Slight.
EnD----- Enon	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
GeB2----- Georgeville	Moderate: too clayey.	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength.	Moderate: too clayey.
GeD2----- Georgeville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
GoB----- Goldston	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock, slope.	Moderate: depth to rock.	Moderate: depth to rock.
GoD----- Goldston	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock.	Severe: depth to rock, slope.
HeB----- Helena	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Moderate: wetness.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HuB*: Helena----- Urban land.	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Moderate: wetness.
IrA, IrB----- Iredell	Severe: too clayey, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: low strength, shrink-swell.	Severe: wetness, ponding.
IuB*: Iredell----- Urban land.	Severe: too clayey, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: low strength, shrink-swell.	Moderate: wetness.
LgB----- Lignum	Severe: too clayey, wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: low strength.	Moderate: wetness.
MeB----- Mecklenburg	Severe: too clayey.	Severe: low strength.	Moderate: depth to rock, shrink-swell.	Severe: low strength.	Severe: low strength.	Slight.
MeD----- Mecklenburg	Severe: too clayey.	Severe: low strength.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope.
MkB*: Mecklenburg----- Urban land.	Severe: too clayey.	Severe: low strength.	Moderate: depth to rock, shrink-swell.	Severe: low strength.	Severe: low strength.	Slight.
MO----- Monacan	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods.	Severe: floods.
MS*: Monacan----- Arents.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods.	Severe: floods.
PaE, PaF----- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PB3*: Pacolet----- Udorthents.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too clayey.
Pt*. Pits						
UL*, UO*. Udorthents						
Ur*. Urban land						
VaB----- Vance	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
VaD----- Vance	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope.
WkB----- Wilkes	Moderate: depth to rock.	Slight-----	Moderate: depth to rock.	Moderate: slope.	Slight-----	Moderate: depth to rock.
WkD----- Wilkes	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: depth to rock, slope.
WkE, WkF----- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
WuD*: Wilkes-----	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: depth to rock, slope.
Urban land.						

* See map unit description for the composition and behavior of the map unit.

TABLE 9.--SANITARY FACILITIES

in this table to describe restrictive soil features are defined in the Glossary. See
 s of "slight," "moderate," "good," "fair," and other terms used to rate soils.
 e means that it is not applicable to rate the soils for the features shown on

	Septic tank absorption n fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
	erate: rds slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----	Fair: too clayey.
	erate: ope, rds slowly.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
	erate: rds slowly.	Moderate: seepage, slope.	Moderate: too clayey, seepage.	Slight-----	Fair: too clayey.
	erate: rds slowly, ope.	Severe: slope.	Moderate: too clayey, seepage.	Moderate: slope.	Fair: too clayey, slope.
	erate: ecs slowly.				
	rate: cs slowly, [pe.				
	rate: ycs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
	rate: pe, cs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
	re: pe.	Severe: slope.	Severe: too clayey, slope.	Severe: slope.	Poor: too clayey, slope.
	re: cs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
	re: cs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
	rate: cs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----	Poor: too clayey.
	rate: cs slowly, pe.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Poor: too clayey.
	re: th to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: seepage.	Poor: small stones, thin layer.
	re: cs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.

f table.

v b

s

t

l

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HuB*: Helena----- Urban land.	Severe: percs slowly.				
IrA, IrB----- Iredell	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: thin layer.
IuB*: Iredell----- Urban land.	Severe: percs slowly, wetness.				
LgB----- Lignum	Severe: percs slowly, wetness.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: too clayey.
MeB----- Mecklenburg	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: too clayey, depth to rock.	Slight-----	Poor: thin layer.
MeD----- Mecklenburg	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope.	Poor: thin layer.
MkB*: Mecklenburg----- Urban land.	Severe: percs slowly.				
MO----- Monacan	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Good.
MS*: Monacan----- Arents.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Good.
PaE----- Pacolet	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
PaF----- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PB3*: Pacolet----- Udorthents.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
Pt*. Pits					
UL*, UO*. Udorthents					

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ur*. Urban land					
VaB----- Vance	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
VaD----- Vance	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
WkB----- Wilkes	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer.
WkD----- Wilkes	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.
WkE, WkF----- Wilkes	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: thin layer.
WuD*: Wilkes----- Urban land.	Severe: depth to rock.				

* See map unit description for the composition and behavior characteristics of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means that it is not applicable to rate the soils for the features shown on this table]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ApB, ApD----- Appling	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
CeB2, CeD2----- Cecil	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
CuB*, CuD*. Cecil Urban land.				
DaB----- Davidson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
DaD----- Davidson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
DaE----- Davidson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
EnB, EnD----- Enon	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
GeB2, GeD2----- Georgeville	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
GoB, GoD----- Goldston	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, area reclaim.
HeB----- Helena	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
HuB*. Helena Urban land.				
IrA, IrB----- Iredell	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
IuB*. Iredell Urban land.				
LgB----- Lignum	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: too clayey.
MeB, MeD----- Mecklenburg	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MkB*. Mecklenburg Urban land.				
MO----- Monacan	Fair: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
MS*: Monacan----- Arents.	Fair: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
PaE----- Pacolet	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
PaF----- Pacolet	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
PB3*: Pacolet----- Udorthents.	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
Pt*. Pits				
UL*, UO*. Udorthents				
Ur*. Urban land				
VaB, VaD----- Vance	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
WkB, WkD----- Wilkes	Fair: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WkE----- Wilkes	Fair: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WkF----- Wilkes	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WuD*. Wilkes Urban land.				

* See map unit description for the composition and behavior characteristics of the map unit.

TABLE 11.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means that it is not applicable to rate the soils for the features shown on this table]

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
ApB----- Appling	Moderate: seepage.	Moderate: low strength.	Not needed-----	Favorable-----	Favorable.
ApD----- Appling	Moderate: seepage.	Moderate: low strength.	Not needed-----	Slope-----	Favorable.
CeB2, CeD2----- Cecil	Moderate: seepage.	Moderate: hard to pack.	Not needed-----	Slope-----	Slope.
CuB*, CuD*. Cecil Urban land.					
DaB----- Davidson	Moderate: seepage.	Moderate: hard to pack.	Not needed-----	Favorable-----	Favorable.
DaD, DaE----- Davidson	Moderate: seepage.	Moderate: hard to pack.	Not needed-----	Slope-----	Slope.
EnB, EnD----- Enon	Moderate: depth to rock.	Severe: shrink-swell, hard to pack.	Not needed-----	Erodes easily, slope, percs slowly.	Percs slowly, erodes easily.
GeB2----- Georgeville	Moderate: slope, seepage.	Moderate: compressible, low strength, erodes easily.	Not needed-----	Favorable-----	Favorable.
GeD2----- Georgeville	Moderate: slope, seepage.	Moderate: compressible, low strength, erodes easily.	Not needed-----	Complex slope, erodes easily.	Slope, erodes easily.
GoB----- Goldston	Severe: seepage.	Severe: thin layer.	Not needed-----	Depth to rock, complex slope.	Favorable.
GoD----- Goldston	Severe: seepage.	Severe: thin layer.	Not needed-----	Depth to rock, complex slope.	Slope.
HeB----- Helena	Moderate: depth to rock.	Moderate: shrink-swell, erodes easily.	Not needed-----	Favorable-----	Favorable.
HuB*. Helena Urban land.					
IrA, IrB----- Iredell	Slight-----	Moderate: hard to pack.	Percs slowly, slope.	Percs slowly, wetness.	Percs slowly, slope.
IuB*: Iredell----- Urban land.	Slight-----	Moderate: hard to pack.	Percs slowly, slope.	Percs slowly, wetness.	Percs slowly, slope.
LgB----- Lignum	Moderate: depth to rock.	Moderate: compressible, low strength.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
MeB----- Mecklenburg	Slight-----	Severe: hard to pack.	Not needed-----	Favorable-----	Peres slowly.
MeD----- Mecklenburg	Slight-----	Severe: hard to pack.	Not needed-----	Slope-----	Slope.
MkB*. Mecklenburg Urban land.					
MO----- Monacan	Moderate: seepage.	Moderate: low strength.	Floods, wetness.	Not needed-----	Wetness.
MS*. Monacan----- Arents.	Moderate: seepage.	Moderate: low strength.	Floods, wetness.	Not needed-----	Wetness.
PaE, PaF----- Pacolet	Moderate: seepage.	Moderate: hard to pack.	Not needed-----	Slope-----	Slope.
PB3*: Pacolet----- Udorthents. Pt*. Pits UL*, UO*. Udorthents Ur*. Urban land	Moderate: seepage.	Moderate: hard to pack.	Not needed-----	Slope-----	Slope.
VaB----- Vance	Slight-----	Moderate: hard to pack.	Not needed-----	Peres slowly, erodes easily.	Peres slowly.
VaD----- Vance	Slight-----	Moderate: hard to pack.	Not needed-----	Slope, peres slowly.	Slope, peres slowly.
WkB----- Wilkes	Severe: depth to rock.	Severe: thin layer.	Not needed-----	Depth to rock, complex slope.	Favorable.
WkD, WkE, WkF----- Wilkes	Severe: depth to rock.	Severe: thin layer.	Not needed-----	Depth to rock, complex slope.	Slope.
WuD*. Wilkes Urban land.					

* See map unit description for the composition and behavior characteristics of the map unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ApB----- Appling	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
ApD----- Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
CeB2----- Cecil	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.	Moderate: too clayey.
CeD2----- Cecil	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: slope.
CuB*: Cecil-----	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.	Moderate: too clayey.
Urban land.					
CuD*: Cecil-----	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: slope.
Urban land.					
DaB----- Davidson	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.	Slight.
DaD----- Davidson	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: slope.
DaE----- Davidson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.
EnB----- Enon	Moderate: percs slowly.	Slight-----	Moderate: percs slowly, slope.	Slight-----	Slight.
EnD----- Enon	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
GeB2----- Georgeville	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.	Moderate: too clayey.
GeD2----- Georgeville	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: slope.
GoB----- Goldston	Moderate: small stones.	Moderate: small stones.	Moderate: depth to rock.	Moderate: small stones.	Moderate: depth to rock.
GoD----- Goldston	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: depth to rock, slope.	Moderate: small stones.	Severe: slope, depth to rock.
HeB----- Helena	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HuB*: Helena----- Urban land.	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly.	Moderate: wetness.	Moderate: wetness.
IrA, IrB----- Iredell	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
IuB*: Iredell----- Urban land.	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
LgB----- Lignum	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Severe: small stones.	Moderate: wetness.	Moderate: wetness.
MeB----- Mecklenburg	Moderate: percs slowly.	Slight-----	Moderate: slope, percs slowly.	Slight-----	Slight.
MeD----- Mecklenburg	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
MkB*: Mecklenburg----- Urban land.	Moderate: percs slowly.	Slight-----	Moderate: slope, percs slowly.	Slight-----	Slight.
MO----- Monacan	Severe: floods, wetness.	Moderate: floods, wetness.	Moderate: floods, wetness.	Slight-----	Severe: floods.
MS*: Monacan----- Arents.	Severe: floods, wetness.	Moderate: floods, wetness.	Moderate: floods, wetness.	Slight-----	Severe: floods.
PaE----- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PaF----- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PB3*: Pacolet----- Udorthents.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: too clayey, slope.
Pt*. Pits					
UL*, UO*. Udorthents					
Ur*. Urban land					

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
VaB----- Vance	Moderate: percs slowly.	Slight-----	Moderate: percs slowly.	Slight-----	Slight.
VaD----- Vance	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope, percs slowly.	Slight-----	Moderate: slope.
WkB----- Wilkes	Slight-----	Slight-----	Severe: slope.	Slight-----	Moderate: depth to rock.
WkD----- Wilkes	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: depth to rock, slope.
WkE----- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
WkF----- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WuD*: Wilkes-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Severe: slope.
Urban land.					

* See map unit description for the composition and behavior characteristics of the map unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
PaE, PaF----- Pacolet	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
PB3*:----- Pacolet	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Udorthents.										
Pt*. Pits										
UL*, UO*. Udorthents										
Ur*. Urban land										
VaB----- Vance	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
VaD----- Vance	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
WkB, WkD, WkE----- Wilkes	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
WkF----- Wilkes	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

* See map unit description for the composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In										
HuB*: Helena-----	0-8	Sandy loam-----	SM, SM-SC, SC	A-2, A-4	0	95-100	90-100	51-86	27-46	<30	NP-9
	8-11	Sandy clay loam, clay loam.	CL	A-6, A-7	0	95-100	95-100	70-90	55-70	30-49	15-25
	11-40	Clay loam, sandy clay, clay.	CH, MH	A-7	0	95-100	95-100	73-93	56-80	50-85	24-50
	40-64	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											
IrA, IrB----- Iredell	0-6	Fine sandy loam	SM	A-2-4, A-4	0-1	90-98	80-90	57-80	30-50	<35	NP-9
	6-24	Clay-----	CH	A-7	0	99-100	85-100	80-100	65-95	60-115	30-85
	24-28	Loam, sandy clay loam, clay loam.	CL, CH, SC	A-7	0-1	98-100	85-100	70-95	40-75	41-60	20-39
	28-65	Variable-----	---	---	---	---	---	---	---	---	---
IuB*: Iredell-----	0-6	Fine sandy loam	SM	A-2-4, A-4	0-1	90-98	80-90	57-80	30-50	<35	NP-9
	6-24	Clay-----	CH	A-7	0	99-100	85-100	80-100	65-95	60-115	30-85
	24-28	Loam, sandy clay loam, clay loam.	CL, CH, SC	A-7	0-1	98-100	85-100	70-95	40-75	41-60	20-39
	28-65	Variable-----	---	---	---	---	---	---	---	---	---
Urban land.											
LgB----- Lignum	0-5	Gravelly silt loam.	ML, CL, SM	A-4, A-6, A-7	0-2	70-85	65-80	55-80	40-70	24-48	8-16
	5-37	Silty clay loam, silty clay, clay.	MH, CH	A-7	0-2	80-90	75-90	70-85	55-85	50-75	22-36
	37-50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MeB, MeD----- Mecklenburg	0-7	Fine sandy loam	ML, SM, SM-SC	A-4, A-6, A-7-6	0-5	90-100	80-100	65-90	36-65	<45	NP-15
	7-34	Clay-----	CH, MH	A-7	0-5	90-100	85-100	80-100	75-95	51-75	20-45
	34-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
MkB*: Mecklenburg-----	0-7	Fine sandy loam	ML, SM, SM-SC	A-4, A-6, A-7-6	0-5	90-100	80-100	65-90	36-65	<45	NP-15
	7-34	Clay-----	CH, MH	A-7	0-5	90-100	85-100	80-100	75-95	51-75	20-45
	34-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											
MO----- Monacan	0-14	Loam-----	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	80-95	55-85	<35	NP-15
	14-43	Fine sandy loam, sandy clay loam, silty clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	60-95	35-85	25-40	7-20
	43-65	Variable-----	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
MS*: Monacan-----	0-14	Loam-----	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	80-95	55-85	<35	NP-15
	14-43	Fine sandy loam, sandy clay loam, silty clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	60-95	35-85	25-40	7-20
	43-65	Variable-----	---	---	---	---	---	---	---	---	---
Arents.											
PaE, PaF----- Pacolet	0-3	Sandy loam-----	SM, SM-SC	A-2	0-2	85-100	80-100	60-80	20-35	<36	NP-10
	3-31	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-65	11-30
	31-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
PB3*: Pacolet-----	0-3	Sandy clay loam	SM-SC, SC	A-4, A-6	0-1	95-100	90-100	65-85	36-50	20-40	4-17
	3-31	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-65	11-30
	31-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Udorthents.											
Pt*. Pits											
UL*, UO*. Udorthents											
Ur*. Urban land											
VaB, VaD----- Vance	0-8	Sandy loam-----	SM, SM-SC	A-2, A-4	0-5	90-100	80-100	55-80	15-40	<27	NP-5
	8-33	Clay loam, sandy clay, clay.	CH, MH	A-7	0-5	95-100	90-100	75-95	65-80	51-80	25-48
	33-50	Weathered bedrock.	---	---	---	---	---	---	---	---	---
WkB, WkD, WkE, WkF- Wilkes	0-7	Loam-----	ML, CL-ML, SM, SM-SC	A-2, A-4	0-10	90-100	80-100	60-92	25-55	<35	NP-7
	7-15	Clay loam, clay, sandy clay loam.	CL, CH, MH, ML	A-6, A-7	0-10	80-100	80-100	75-95	50-80	30-60	11-32
	15-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
WuD*: Wilkes-----	0-7	Loam-----	ML, CL-ML, SM, SM-SC	A-2, A-4	0-10	90-100	80-100	60-92	25-55	<35	NP-7
	7-15	Clay loam, clay, sandy clay loam.	CL, CH, MH, ML	A-6, A-7	0-10	80-100	80-100	75-95	50-80	30-60	11-32
	15-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											

* See map unit description for the composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	<u>In</u>	<u>In/hr</u>	<u>In/in</u>	<u>pH</u>			
ApB, ApD-----	0-11	2.0-6.0	0.10-0.15	4.5-5.5	Low-----	0.24	4
Appling	11-43	0.6-2.0	0.15-0.17	4.5-5.5	Moderate-----	0.20	
	43-66	0.6-2.0	0.12-0.16	4.5-5.5	Low-----	0.24	
CeB2, CeD2-----	0-6	0.6-2.0	0.13-0.15	4.5-6.0	Low-----	0.28	3
Cecil	6-53	0.6-2.0	0.13-0.15	4.5-5.5	Moderate-----	0.28	
	53-65	---	---	---	---	---	
CuB*, CuD*:							
Cecil-----	0-6	0.6-2.0	0.13-0.15	4.5-6.0	Low-----	0.28	3
	6-53	0.6-2.0	0.13-0.15	4.5-5.5	Moderate-----	0.28	
	53-65	---	---	---	---	---	
Urban land.							
DaB, DaD, DaE----	0-7	0.6-2.0	0.14-0.18	4.5-6.5	Low-----	0.28	5
Davidson	7-16	0.6-2.0	0.15-0.18	4.5-6.0	Low-----	0.32	
	16-99	0.6-2.0	0.12-0.16	4.5-6.0	Low-----	0.24	
EnB, EnD-----	0-7	2.0-6.0	0.11-0.15	5.1-6.5	Low-----	0.37	4
Enon	7-36	0.06-0.2	0.15-0.20	5.1-7.8	High-----	0.32	
	36-60	---	---	---	---	---	
GeB2, GeD2-----	0-5	0.6-2.0	0.13-0.18	4.5-6.0	Low-----	0.37	3
Georgeville	5-35	0.6-2.0	0.13-0.18	4.5-5.5	Low-----	0.37	
	35-49	0.6-2.0	0.13-0.18	4.5-5.5	Low-----	0.43	
	49-99	0.6-2.0	0.05-0.10	4.5-5.5	Low-----	0.43	
GoB, GoD-----	0-8	2.0-6.0	0.10-0.15	4.0-6.0	Low-----	0.20	2
Goldston	8-16	2.0-6.0	0.10-0.15	4.0-6.0	Low-----	0.20	
	16-24	2.0-6.0	0.05-0.10	4.0-6.0	Low-----	0.20	
	24-62	---	---	---	---	---	
HeB-----	0-8	2.0-6.0	0.10-0.12	4.5-6.0	Low-----	0.37	3
Helena	8-11	0.2-0.6	0.13-0.15	4.5-5.5	Moderate-----	0.37	
	11-40	0.06-0.2	0.13-0.15	4.5-5.5	High-----	0.32	
	40-64	---	---	---	---	---	
HuB*:							
Helena-----	0-8	2.0-6.0	0.10-0.12	4.5-6.0	Low-----	0.37	3
	8-11	0.2-0.6	0.13-0.15	4.5-5.5	Moderate-----	0.37	
	11-40	0.06-0.2	0.13-0.15	4.5-5.5	High-----	0.32	
	40-64	---	---	---	---	---	
Urban land.							
IrA, IrB-----	0-6	2.0-6.0	0.12-0.15	5.6-7.3	Low-----	0.32	3
Iredell	6-24	0.06-0.2	0.16-0.22	6.1-7.3	Very high-----	0.20	
	24-28	0.06-0.6	0.14-0.18	6.1-7.8	High-----	0.28	
	28-65	---	---	---	---	---	
IuB*:							
Iredell-----	0-6	2.0-6.0	0.12-0.15	5.6-7.3	Low-----	0.32	3
	6-24	0.06-0.2	0.16-0.22	6.1-7.3	Very high-----	0.20	
	24-28	0.06-0.6	0.14-0.18	6.1-7.8	High-----	0.28	
	28-65	---	---	---	---	---	
Urban land.							
LgB-----	0-5	0.6-2.0	0.11-0.18	4.5-5.5	Low-----	0.43	2
Lignum	5-37	0.06-0.6	0.10-0.18	4.5-5.5	Moderate-----	0.43	
	37-50	---	---	---	---	---	

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth <u>Ft</u>	Kind	Months	Depth <u>In</u>	Hard-ness	Uncoated steel	Concrete
ApB, ApD----- Appling	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CeB2, CeD2----- Cecil	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CuB*, CuD*: Cecil-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Urban land.											
DaB, DaD, DaE----- Davidson	B	None-----	---	---	>6.0	---	---	>60	---	High-----	Moderate.
EnB, EnD----- Enon	C	None-----	---	---	>6.0	---	---	>60	---	High-----	Moderate.
GeB2, GeD2----- Georgeville	B	None-----	---	---	>6.0	---	---	>60	---	High-----	High.
GoB, GoD----- Goldston	C	None-----	---	---	>6.0	---	---	20-40	Rip- pable	Moderate	High.
HeB----- Helena	C	None-----	---	---	1.0-2.5	Perched	Jan-Mar	40-60	Rip- pable	High-----	High.
HuB*: Helena-----	C	None-----	---	---	1.0-2.5	Perched	Jan-Mar	40-60	Rip- pable	High-----	High.
Urban land.											
IrA, IrB----- Iredell	D	None-----	---	---	1.0-2.0	Perched	Nov-Mar	>60	---	High-----	Low.
IuB*: Iredell-----	D	None-----	---	---	1.0-2.0	Perched	Nov-Mar	>60	---	High-----	Low.
Urban land.											
LgB----- Lignum	C	None-----	---	---	1.0-2.5	Apparent	Dec-May	48-72	Hard	High-----	High.
MeB, MeD----- Mecklenburg	C	None-----	---	---	>6.0	---	---	48-60	Hard	High-----	Moderate.
MkB*: Mecklenburg-----	C	None-----	---	---	>6.0	---	---	48-60	Hard	High-----	Moderate.
Urban land.											
MO----- Monacan	C	Common-----	Brief-----	Nov-May	0.5-2.0	Apparent	Nov-May	>60	---	Moderate	High.
MS*: Monacan-----	C	Common-----	Brief-----	Nov-May	0.5-2.0	Apparent	Nov-May	>60	---	Moderate	High.
Arents.											
PaE, PaF----- Pacolet	B	None-----	---	---	>6.0	---	---	>60	---	High-----	High.

See footnote at end of table.

SOIL SURVEY

LE 16.--SOIL AND WATER FEATURES--Continued

		Flooding		High water table			Bedrock		Risk of corrosion	
		Duration	Months	Depth	Kind	Months	Depth	Hard- ness	Uncoated steel	Concrete
				<u>Ft</u>			<u>In</u>			
g p	r	---	---	>6.0	---	---	>60	---	High-----	High.
		---	---	>6.0	---	---	>60	---	High-----	High.
	c	---	---	>6.0	---	---	40-80	Hard	Moderate	Moderate.
	t	---	---	>6.0	---	---	40-80	Hard	Moderate	Moderate.

composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution										Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve							Percentage smaller than--					Maximum density	Optimum moisture
	AASHTO	Unified	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm				
Cecil scl:1 (S74NC-119-002)													Pct		Lb/ Ft ³	Pct
Ap-----0 to 6	A-6 (03)	SC	100	100	100	99	98	81	50	41	31	24	35	12	107	17
B22t-----18 to 35	A-7-5(38)	MH	100	100	100	100	100	96	90	86	70	58	77	32	89	31
Helena sl:2 (S74NC-119-008)																
Ap-----0 to 8	A-4 (00)	SC	100	100	100	99	95	63	36	32	23	16	27	9	118	12
B22t-----15 to 23	A-7-5(33)	CH	100	100	100	100	98	80	71	70	60	53	75	44	97	24
Iredell fsl:3 (S74NC-119-005)																
Ap-----0 to 8	A-2-4(00)	SM	100	99	96	92	82	57	32	18	10	6	--	NP	120	13
B21t-----12 to 23	A-7-6(68)	CH	100	100	100	100	100	95	85	74	52	51	78	79	90	26
Iredell fsl:4 (S74NC-119-009)																
Ap-----0 to 6	A-4 (00)	SM	100	100	100	96	88	61	37	17	10	7	31	6	121	16
B21t-----6 to 19	A-7-6(72)	CH	100	100	100	100	100	95	88	82	73	70	99	73	88	30
Mecklenburg fsl:5 (S74NC-119-011)																
Ap-----0 to 7	A-4 (00)	SM-SC	100	100	99	99	96	69	37	20	11	6	23	4	129	14
B22t-----15 to 22	A-7-5(40)	CH	100	100	100	100	100	95	83	74	59	52	73	43	94	27
Pacolet sl:6 (S74NC-119-012)																
A1-----0 to 3	A-2-4(00)	SM	100	100	100	100	99	65	32	22	10	7	36	8	107	15
B21t-----3 to 17	A-7-5(23)	MH	100	100	100	100	100	90	73	67	54	48	62	30	94	26

See footnotes at end of table.

SOIL SURVEY

TABLE 17.--ENGINEERING TEST DATA--Continued

No.	Classification		Grain size distribution										Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve							Percentage smaller than--					Maximum density	Optimum moisture
	2 in.	3/4 in.	3/8 in.	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm						
	AASHTO	Unified													Pct	
13)	A-4 (01)	SM	100	97	94	92	89	74	50	24	9	5	35	6	106	18
to 4	A-7-6(24)	CH	100	100	100	100	100	89	74	56	43	36	55	32	105	20

dy clay loam:
 of I-85 on U.S. Highway 21, 0.4 mile west of junction of North Carolina 115 on State Route
 SE of intersection of State Route 2100.
 ndy loam:
 of Huntersville on U.S. Highway 21, 0.4 mile west on Alexanderana Road, 50 ft. south of road
 fine sandy loam:
 f Newell on Old Concord Road, 0.2 mile east on McLean Road, 0.3 mile north on private drive,
 of 850, SE of pond.
 fine sandy loam:
 Pineville on North Carolina Highway 51, 1.5 mile north on State Route 3687, 400 yds. east
 rg fine sandy loam:
 est of Charlotte on North Carolina Highway 49, 0.8 mile south on State Route 1122, 40 ft.
 n field.
 andy loam:
 e, 350 ft. past junction of State Route 1102 and State Route 1101, 50 ft. east of road
 am:
 f North Carolina Highway 49 at University of North Carolina at Charlotte on State Route
 orth of road in woods.

s

l

a

b

6

1

.

.

.

.

9

.

.

.

.

.

.

m

4

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

NRCS Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at <http://offices.sc.egov.usda.gov/locator/app>.